Gas Journal

JULY 8, 1936

Vol. 215 88th Year No. 3816

Editorial Notes

Greater Uniformity Needed

LAST week we referred in these columns to the Report of the Committee on Electricity Distribution, which consisted of Sir Harry McGowan (Chairman), Sir John Snell, and Mr. John Morison, appointed by the Minister of Transport. The Committee was set up to review the present position of electricity supply and to make recommendations to secure a cheaper, more satisfactory, and more universal supply of electricity, and the main findings of the Committee were outlined in the "JOURNAL" last week. The report maintains that there are far too many small separate authorized undertakings, and that the existence of so many undertakings, supplying at different tariffs and different voltages, and offering unequal facilities for the hire and hire-purchase of apparatus, and so on, is definitely detrimental to the furtherance of a cheap supply of electricity. The Committee considers that a much greater measure of amalgamation and co-ordination of both local authority and company undertakings is necessary, and that to ensure this there will have to be legislation conferring definite and adequate compulsory powers.

The setting-up of this Committee in itself is another indication of the great interest which the Government exhibits in electricity supply, and its determination to assist in its progress. Which leads us to ask whether the lack of attention given to the Gas Industry is due to complete satisfaction with its organization or traceable to apathy and indifference. We may not welcome Government interference, but the fact remains that there is a parallel between the gas and electrical industries in many respects. Compared with electricity supply, there are actually a greater number of separate gas undertakings, the policies of which exhibit remarkable divergencies. Calorific value varies, tariffs vary, facilities for the acquisition of gas-burning equipment vary. Moreover, these differences cannot always be explained away by the "local conditions and circumstances" plea. Under the same conditions and in like areas undertakings are by no means necessarily acting alike. This may be a sign of individuality; it may be due to the parochial outlook. In any case, this lack of cohesion and reasonable uniformity of policy does not make for strength in the Gas Industry. To-day a man living at one end of a street may be able to obtain gas for, say, central heating on economic terms, while were he to move to the other end of the street the terms offered might be prohibitive. There may at the moment be explanation, but we may be forgiven for querying whether the public will stand satisfied for ever with the different policies and outlook of neighbouring gas undertakings. Regarding tariffs, we mentioned last week that the Committee on Electricity Distribution recommend that the Minister of Transport should be empowered to require all electricity undertakers to offer an approved statutory two-part tariff for domestic supplies as an alternative to the flat rate charge.

It is surely desirable to aim in the Gas Industry at greater uniformity not only on matters of sales policy, but also in the quality, by which we mean composition and specific gravity, as well as calorific value, of the gas made. More uniformity would render possible the application of fixed nipples on appliances and would generally result in more satisfactory service. In his recent Institution Paper, Mr. C. A. Masterman referred to this question, and mentioned that the policy of standardizing orifice size is facilitated by the size of the Gas Light and Coke Company, which is in a position to buy large numbers of appliances all of which will operate on gas of one fixed calorific value and limited variation in specific gravity and flame velocity. Said Mr. Masterman: "The present variations throughout the country in calorific value and other qualities might throw an intolerable burden on the appliance manufacturers if they were required to supply each undertaking appliances pre-set to each particular gas quality. If this be so, the Gas Industry and the gas consumer pay a heavy price in money and in service for the liberty in manufacturing processes each undertaking can exercise." Even if country-wide uniformity is impracticable, at any rate local uniformity in essential gas properties is clearly desirable, and it is a matter which should be tackled.

Joint Control

IN so far as the Report deals with gas it would, of course, be foolish to expect any impartial statement. It has formerly been the practice of the electricity expert to ignore the existence of the Gas Industry. To him, the people sit in darkness, their bodies unwarmed and their food uncooked, awaiting the time when it shall please the Goddess Electra to confer upon them the amenities of civilization.

Hence the frequent comparisons of the consumption of electricity in this country with that of other countries such as Scandinavia, where it may be said that coal, and therefore gas, scarcely exist, and where water power is abundant.

It was no doubt the wish—which, we are told, is

Father to the thought—of these experts that the Gas Industry would rapidly decline under the pressure of electrical competition. The continued and increasing prosperity of the Gas Industry has exposed the fallacy of ideas of this kind, and it has been necessary for the electricity enthusiast to change his tune.

It is now, therefore, the custom to suggest that there is some nefarious and invidious conspiracy to keep electricity from the people. The villain of the piece is discovered by the Committee on Electricity Distribution to be the joint committees which in many cases control both the gas and electricity departments of local authorities. "Such a Committee," the Report states, "must necessarily consider any proposal relating to one undertaking from the point of view of its effect on the other. It has been suggested to us in evidence that this may be detrimental to the proper development of the electricity undertaking which is the later undertaking to be established; may tend to suppress competition; and cannot make for progress." A catalogue of the crimes of joint committees is then supplied: They hesitate to extend mains in streets in which a supply of gas is available, they are reluctant to introduce attractive tariffs, and—the foulest crime of all—they do not provide electricity in housing schemes where gas is already installed.

It would be interesting to know the type of witness from whom this evidence was obtained, and what facilities existed for cross-examination. Certainly no representative of the Gas Industry was consulted.

Fair Play to Tenants

Week by week it has been our unpleasant task to call attention to cases in which unfair methods have been adopted by local authorities to foster electricity, and cases could be cited where local authorities owning gas undertakings have restricted the sale of gas in favour of the supply of an electricity company. That the Gas Industry has proved its case is sufficiently demonstrated by the fact that Parliament, after full enquiry, both in public and private legislation, has sought to secure fair play for tenants of council houses who desire to take gas. The fact that section 27 of the Gas Undertakings Act, 1934, while conferring upon council tenants the right to take gas, does not give them a corresponding right to take electricity, is amply evidence that the electricity industry cannot prove to Parliament that restrictions upon electricity in favour of gas are sufficiently common to justify legislation. Could anyone doubt that if a real case of injustice to the electricity industry could be proved, Parliament would refuse to pass in their favour legislation similar to that accorded to the Gas Industry?

We are gratified, if somewhat amused, to notice that the Committee deplore any "unfair restriction on the freedom of choice to which every consumer should be entitled." It would be interesting to know in somewhat fuller detail the precise meaning attached by the Committee to the words "unfair restriction." Is it an "unfair restriction" for a council to give every facility for the wiring during erection of houses for electricity and to deny a similar right to the gas undertaking? Is it an "unfair restriction" to fill every available corner of a small house with electrical apparatus which the tenant is told he may not move or to charge prohibitive rates for electric light where gas is used for cooking? The fact that the Gas Light and Coke Company (No. 2) Bill and the York Gas Bill have passed through their initial Parliamentary stages is indication that the House of Commons has views on some of these matters.

The electricty industry is no longer in its infancy, and it is high time that it put away such recriminations.

Rating

On the subject of the assessment of electricity undertakings for rates, the view of the Committee will be cordially endorsed by the Gas Industry. The Report calls attention to the injustice of the incidence of de-rating from the benefits of which all public utilities are excluded. The Committee point out that whereas the generating plant of individual industries is de-rated, no such relief can be claimed by the public utility, and this obviously increases the difficulty of competition by the authorized distributors to compete with private generating plant.

The injustice is even greater in the case of the Gas Industry, which is so largely interested in residuals. The coke ovens which sell coke in competition with the Gas Industry are to a substantial degree relieved of the burden of rates. Gas-works are fully rated.

The Conjoint Conference struggled hard to obtain an extension of the de-rating benefits to public utilities in 1928, and has never ceased to give publicity to what is so obvious an injustice. Unfortunately the question does not depend upon principles of justice or equity, but upon those of hard cash. The Government cannot afford to bear any further burden in connection with local authorities, and in his present temper it is not likely that the Chancellor of the Exchequer will listen to arguments on the subject.

More practical, however, is the demand for a more uniform method of assessment; and we would welcome the recommendation that "assessments should be based on the undertaking as a whole, the gross assessment being subsequently apportioned among the respective assessable districts." The Central Valuation Committee in its Seventh Series of Recommendations has pointed out that this is the correct method of assessment, and the fact that the Committee on Electrical Distribution has thought it necessary to call attention to the matter is an indication that the views of the Central Valuation Committee have not been adopted by all rating authorities.

It is understood that further representations have been made to the Ministry of Health and to the Central Valuation Committee by the Conjoint Conference urging that the procedure relating to the assessment of public utilities should be amended by legislation. The fact that no derating benefits are enjoyed by gas, water, and electricity undertakers entitles them to expect special consideration to be given to their views. Possibly the influence of the McGowan Committee may be of assistance to public utilities in dealing with the Government on this matter.

Increased Gas Wages

For a number of years now there has been a notable absence of any discussion in the columns of the "Journal" of wage questions—of the wages, that is to say, paid to that large section of industry which is classified as "gasworkers." It is true that we have often, and especially in recent times, had reason to comment on the wage situations of other industries which have important bearings on our own, particularly, of course, in connection with coal mining and the engineering trades upon which we are dependent respectively for our primary raw material and our gas making and gas consuming plant. But on the whole the machinery regulating our own wage questions has worked so smoothly, and with so much satisfaction to both sides, that we have felt that the Gas Industry has indeed deserved the reputation it has achieved for being able to arrive at a square deal without the alarms and excursions, and the washing

of dirty linen in public, which accompany every negotiation in many industries which are of far smaller national importance.

The Gas Industry is, of course, a public utility in the truest sense of the term, and it supplies the nation with an essential commodity. Its wages questions have long been decided by both sides—employers and employees—with a due sense of responsibility towards the great public which needs its products, and which obviously is vitally affected in its everyday life by the level at which gasworkers' wages stand. We in the Industry have always had due regard for these considerations, and have not felt bound to look upon rises and falls in wage levels as a triumph for the astuteness in negotiation or the industrial power of either side, but rather as a reflection of what is just and proper in all the circumstances of the day, and having due regard to the interests of the public whom we serve.

Having taken our stand on these principles, we must face up, on them, to the national increase in gasworkers' wages which has been announced over the week-end to all its members by the Federation of Gas Employers. Those who know the full story of the gas wage negotiations which have taken place in recent years realize with what patience they have been conducted on both sides since the reduction in some, though not all, of the districts which was agreed by the Joint Industrial Council on the employers' application at the end of 1931. This was, of course, at a time when many industries were forced to put into operation what were known as " economy cuts " to meet the serious general industrial situation, though it was made quite clear at the time that the reduction in parts of our Industry was not regarded in any sense as such, but was agreed by both sides of the Council simply on the merits of the case. Since that time—and quite naturally, seeing that the machinery is permanently in existence for such purposes—a continuous succession of claims for an all-round increase has been brought forward by the workers' side, culminating in a definite request in April this year for an early " aye or no " to an application, made in July last year, for an increase of 1d. per hour in the wages of all sections governed by the decisions of the Joint Council. It is now general knowledge that settlement has finally been reached on the basis of ½d. an hour for day workers, and 4d. per shift for shift workers, with proportionate increases in the wages of piece workers.

The total bill will, of course, be very heavy—at least half-a-million a year to be found from somewhere—and it would have been easier to contemplate had we not been faced at the same time with rising costs in other directions, notably the at present uncertain total rise in the cost of our 17 million tons of coal, in raw materials generally, and in the manufacturing plant and consuming appliances which are essentials of our service to the public. And it is essential that the public should not lose sight of all those factors, while it demands cheap gas as a prime necessity of everyday life, while it relies upon us to remunerate our workers at economic and fair rates without jeopardizing the supply of gas by risk of industrial strife, while at the same time it expects us to play a leading part in rescuing the coal industry from the depths of its depression, and while it is urged in season and out to approve of every state-aided measure, however uneconomic, designed to forward the interests of our greatest competitor, the electricity industry.

In all the circumstances we cannot expect the agreement reached in the Joint Council to be hailed with joy by every gas employer. Faced with competition which is keen throughout and frequently not scrupulously fair, the Gas Industry is meeting critical years. The fact that the employers have felt justified, even under these conditions, in agreeing to an increase in wages indicates a spirit of optimism and confidence which is of good augury. It is almost a platitude to say that the Industry must make one more big effort, but it is quite true that if effort was already needed, as indeed it was, the need will not be lessened by the present increased burden of cost.

New Road Plan

As we go to press the announcement is made that the Government is to take over responsibility for about 4,500 miles of trunk roads on the main through routes. The responsibility, of course, is that of the Ministry of Transport, which has electricity under its wing, and the aim is " uniform standards." In which regard two matters stand out clearly enough—the one, lighting; the other, road preparation, surfacing, and maintenance. It is proposed that the transfer of the trunk roads to the Ministry in England and Wales shall take place as from April 1, 1937, and in Scotland from May 16. Between then and now there must be a time of testing between gas and electricity as an illuminant and between British tar and imported bitumen as a safe road maker. There are two corollaries to this: First, the Gas Industry must vindicate its claims to sell the most reliable, accommodating, and economic source of road lighting; secondly, it must also vindicate its claims to produce and apply the safest, most durable, most economic form of material, in tar, for first-class road-making. Whatever the opposition—and obviously it will not be of the weakest—the Gas Industry will, we trust, be given a sympathetic hearing in the next few months. All the conferences staged in the meantime to discuss in friendly atmosphere ways and means must have more collective thrust than hitherto. In the new proposals our Industry has unquestionably a real chance of helping towards a full measure of success.

Coke Sales

JUST to hand are the results of the Oldham Corporation Gas Department for the past financial year, and in his report to the Gas-Works Committee Mr. Ernest Parry, the Commercial Manager, is able to record an increase in the sale of gas and also a largely increased revenue from coke sales. The Oldham Gas Department is reaping the fruits of earlier work in selling coke—activities which have been recorded in the " JOURNAL," and which helped towards the decision of the Manchester City Council to carry out practical experiments, extending over a year, on the use of gas coke and other solid smokeless fuel. For a considerable period the Oldham Gas Department has been pushing coke grates, and Mr. Parry explains that the installation of such grates is rapidly on the increase, and to a large extent has been taken out of the Department's hands, private builders planning to erect coke grates without solicitations on the part of the Department. And he prophesies that the next twenty-five years will see a revolution in the matter of fuel consumption in the domestic grate. Of course, the Department is marketing graded fuel, and is arriving at the position when the smaller grades will realize almost as much as the large-sized coke—this is reflected in the revenue from coke for the past financial year.

As mentioned in the " JOURNAL " last week, the Oldham Gas Committee has adopted a new scale of charges. It is proposed to introduce a two-part tariff with a standard service charge of 10s. a quarter. A householder having paid this sum can then have gas at the rate of 1s. 9d. per 1,000 cu.ft., or just under 4½d. a therm.

And here is a very interesting feature of the scheme. Those who avail themselves of the two-part tariff and sign an undertaking to use only gas and coke for heating are to receive a reduction of 5% on the current price of coke. Others who do not take advantage of the new tariff can secure a 5% reduction in the price of gas and coke by giving a similar undertaking. Such a scheme should, we suggest, have strong popular appeal.

The Oldham scheme reminds us of the suggestion made last year by Mr. A. L. Jennings in his Presidential Address to the Manchester District Association of Gas Engineers. His argument in regard to surplus coke was intriguing. A consumer of gas who uses 30,000 cu.ft. has had approximately 2 tons of coal used for its production, resulting in the production of about 1 ton of coke for sale. If the consumer buys this ton of coke at yard price, his gas has been produced possibly 2d. to 3d. per cu.ft. cheaper than that for another consumer who leaves the coke as a surplus which the gas undertaking may have to sell for shipment. The use was suggested of a coupon attached to tickets for coke sold for domestic consumption, entitling the consumer to a reduction in the price of gas by a certain amount, in the ratio of 2 cwt. of coke to 3,000 cu.ft. of gas. Whatever the method adopted, the idea of linking up gas sales and coke sales appears to offer considerable promise.

Personal

The wedding of Miss JOYCE WALMSLEY, daughter of Mr. P. D. Walmsley, Managing Director of the Great Yarmouth Gas Company, took place at St. Saviour's Church, S.W. 1, on Tuesday, June 30. The bridegroom, Mr. Stanley A. Jackson, is the son of Mr. and Mrs. A. Jackson, of Thornton Heath. After the ceremony a reception was held at the Hotel Rubens, Buckingham Palace Road, and the bride and bridegroom afterwards left for their honeymoon in South Devon.

* * *

The West Bromwich Town Council have approved the appointment of Mr. DAVID GREEN as Gas Engineer and Manager in succession to Mr. J. Hunter Rioch.

Mr. Green, who entered the Gas Department as a Works Chemist a number of years ago, was later appointed Deputy Engineer and Manager.

* * *

On Thursday, July 2, Mr. WILLIAM WHITEHEAD attended his last meeting of the Directors of the Hayfield Gas Company after being Secretary of the Company for a period of thirty years. The Directors and Staff made him a suitable presentation. The Chairman, Mr. F. A. Turner, spoke in terms of high praise of the services rendered by Mr. Whitehead over a long period. Mr. Whitehead suitably acknowledged the gift and the kind wishes for a long and happy retirement which accompanied it. He concluded his services with the Company on Tuesday, June 30.

* * *

Mr. W. A. DEARDEN, Engineer and Manager to the Lancaster Corporation Gas Department, was on July 2 elected President of the Lancaster Rotary Club.

Gas Supply in Paris

Annual Report of the Société du Gaz

The Annual Report of the Société du Gaz de Paris for 1935 shows that the output during the past twelve months amounted to 17,626,921,300 cu.ft. as against 18,191,181,600 cu.ft. in 1934. The number of consumers again shows an increase from 1,008,628 at the end of 1934 to 1,048,022 at the close of the past year. During the twelve months the Company laid about fifty miles of new mains, the bulk of which was renewal work. The actual extension of the distribution system, which now aggregates 1,652½ miles, was about 8½ miles.

Despite the competition from electricity the public lighting supplied by the Paris Company is still giving satisfaction, evidence of which is afforded by the fact that the number of normal-pressure burners in use for this purpose still amounts to 12,127, while the number of inverted multi-burners advanced from 15,982 at the end of 1934 to 15,987 last year. An interesting item of the report is that, to provide against darkened streets as the result of a failure of the supply in those thoroughfares which have electric lighting, no fewer than 39,876 emergency gas lights have now been installed as compared with 39,188 this time last year. Still another interesting item of information to British gas engineers, especially in view of the great increase which is taking place in the number of illuminated "safety first" street refuges in this country, is to the effect that the number of such refuges in Paris which are gas-illuminated has been increased during the past twelve months from 563 to 707.

Cooking and other gas-operated domestic appliances continue to make steady progress, a feature of the showroom experience being that there is now a marked tendency on the part of household consumers to acquire their own stoves and other apparatus on the gradual payment or hire-purchase system than merely to hire them from the Company as was the case some years ago. As a result of the continuance of the refrigeration campaign, the number of gas-operated refrigerators in use is steadily increasing, no fewer than 442 having been installed during the past year. Steady progress is also recorded as regards the adoption of gas cooking in hotels, restaurants, and other large establishments, as also in pastry-making shops and bakeries.

Association of Public Lighting Engineers

Forthcoming Conference at Cheltenham

The Association of Public Lighting Engineers are this year holding their Thirteenth Annual Conference at Cheltenham, at the invitation of the Mayor and Corporation, from Monday, Sept. 7, to Thursday, Sept. 10.

It promises to be a gathering of outstanding importance, and already over three hundred local authorities have intimated their intention of sending as delegates their lighting engineers or members of lighting committees to represent them. The proceedings will be opened by Sir Charles Bressey, C.B., who, as the Chief Engineer of the Highways Development Survey of Greater London, will be in a unique position to advocate the needs for greater efficiency in street lighting.

There follows the President's (Mr. E. C. Lennox, M.I.E.E., of Newcastle-upon-Tyne) Address and a series of sessions devoted to various phases of street lighting, both gas and electricity, and several well-known personalities will open the discussions. A feature of this year's Conference will be the Exhibition of Street Lighting Equipment, which will be staged in the Main Hall of the Winter Gardens, and all the chief firms specializing in lighting will be represented. The streets of Cheltenham will be especially illuminated for the occasion by modern equipment, while all the important buildings in the town and the Winter Gardens will be floodlighted.

This important Conference which has in the past been responsible for great improvements in street lighting generally, should attract all lighting engineers. The organization of the Conference and Exhibition is in the hands of Mr. H. O. Davies, Secretary of the Association of Public Lighting Engineers, 13, Victoria Street, S.W. 1.

Forthcoming Engagements

July.

14.—N.G.C.—Meeting of the Central Executive Board at 2.30 p.m.

14.—NATIONAL JOINT INDUSTRIAL COUNCIL FOR THE GAS INDUSTRY.—Annual Meeting at 11.45 a.m.

15.—B.C.G.A.—Executive Committee Meeting at 11.30 a.m. General Committee at 2.30 p.m.

16.—S.B.G.I.—Council Meeting at 2.30 p.m.

24.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—County Meeting at Swindon.

Aug.

11.—IRISH ASSOCIATION OF GAS MANAGERS.—Annual Meeting at Jury's Hotel, Dublin.

Sept.

10.—NORTH BRITISH ASSOCIATION.—Annual Meeting at Kirkintilloch.

News in Brief

New Showrooms were opened by the Irvine Gas Company in High Street on July 2. A luncheon was afterwards held in the King's Arms Hotel.

A Public Lighting Contract for a further three years has been entered into with the Leighton Buzzard Urban District Council by the Leighton Buzzard Gas Company.

Application to Borrow the sum of £10,000 in respect of expenditure on general mains extensions is to be made by the Stoke-on-Trent City Gas Committee to the Ministry of Health.

An Extension of the existing limits of gas supply is one of the objects of a Special Order for which the Chorley Corporation intend to apply to the Board of Trade under the Gas Undertakings Acts, 1920 to 1934.

The Tender of Messrs. C. & W. Walker, Ltd., of Donnington, amounting to £22,278, for the supply and erection of the proposed new gasholder at the Newcastle-under-Lyme Works, has been accepted by the Town Council.

Application for a Special Order under the Gas Undertakings' Acts, 1920 to 1934, is intended to be made to the Board of Trade by the Abergavenny Gas Department with the object, among others, of extending the existing limits of supply.

For Sale by Tender Messrs. A. & W. Richards, 37, Walbrook, E.C. 4, have been instructed by the Chichester Gas Company to offer £5,000 4½% preference stock at a minimum price of issue of £105 per £100, yielding at that price £4 5s. 9d.%.

A Copy of the Journal and Transactions of The Society of Engineers has recently been received by us from the Society. The publication has been edited by Mr. A. S. E. Ackermann, B.Sc., A.M.Inst.C.E., and includes an Agricultural Section and a Short History of Broadcasting.

A Reorganization Scheme costing £191,000 is to be put in hand at the end of the summer by the Bradford Gas Department. The Government has just sanctioned the borrowing of £100,000 towards the cost of the work. The alterations and improvements will take until the end of 1938.

The Tender of Messrs. R. & J. Dempster, Ltd., Manchester, has been accepted by the Belfast Corporation for the construction of a waterless gasholder, with internal electric hoist, complete with foundations, at £68,648. The holder will be erected on ground recently acquired from the Great Northern Railway.

A Four-Days' Exhibition was held at Dalry last week. The exhibition was run by the Dalry Gas Light Company in conjunction with Messrs. R. & A. Main, Falkirk. Mrs. James M'Cosh, of Pitcon, opened the exhibition. Votes of thanks to everyone concerned in the making of the demonstration a success were proposed by Mr. J. Wilson, Manager.

Proposals to Convert Unsuitable Fire Grates in premises under the control of the Liverpool Corporation Health Committee to enable them to consume smokeless fuel have been engaging the attention of the Committee. The Medical Officer of Health has prepared a report on the suggested conversion. The Committee decided to request the Land Steward and Surveyor and the City Engineer to report on the estimated cost of effecting the conversion.

The Sale of their Gas Undertaking is not desired by the Wallasey Corporation Gas Committee who have resolved that no action be taken with regard to the letter asking for permission to arrange negotiations for the purchase of the Undertaking. The question was asked at the July Town Council meeting whether the letter was from a prospective purchaser or an enquiry from an agent. The Chairman of the Gas Committee replied it was from an agent.

We Have Received from the publishers of the *Refractories Journal* a copy of their Classified Index of articles which have appeared in their journal, which is the official organ of the Refractories Association of Great Britain, since its inception. The Index also includes a complete list of authors. This year the Index appeared with the June number, but in future, of course, it will be published annually. The publication should prove to be of great value to all engaged in refractories, and allied industries. It is a key to a wealth of technical knowledge, covering a period of over ten years.

The Activities of the British Road Tar Association are explained in some detail in the new booklet which the Association has recently issued to all its Members. In addition, the publication records the results achieved by its efforts. The good services of the Association are well known to the majority of our readers; it is well to record, however, some of the significant figures relating to propaganda for British Non-Skid Roads. Over 2,200 advertisements have been inserted in 60 papers in eight years; one of the Association's films—viz., "Tar," has been shown to over 1,500,000 members of the general public; and in the editorial publicity line, commenced in 1930, 4,200 articles and paragraphs have appeared in 750 papers in the last five years.

New Charges at Port Talbot

Two-Part Tariff Introduced

The Port Talbot Gas Department has introduced a two-part tariff for domestic consumers. The annual fixed charge is based on rateable value—20% up to £10 rateable value, and above £10 a fixed charge of £2 *plus* 2s. for each £1 by which the rateable value exceeds £10.

Quarterly meter consumers may then obtain their gas at 5d. a therm; prepayment consumers who provide their own installation at 5·5d. a therm; and prepayment consumers provided with a "free" installation at 6d. a therm.

New Season's List of Stoves, Ltd.

Some Important Improvements

An attractive publication is the new season's list of Stoves, Ltd., Rainhill, Liverpool. The covers are primrose embossed with gold and overprinted with a cornflower shade of blue.

Since the publication of last year's list some important improvements have been effected in the Company's products. Chief among these improvements are the new oven interior with enamelled runners, the improved circular grills, and the new concealed oven supply pipe. The "New Bakerloo" cookers in Jubilee blue or Marina green self colours are the foremost features in this list. There are other refinements in the "New Bakerloo" series which are described in the succeeding pages. A stamped steel porcelain enamelled plate rack with wallplate and a loose enamelled cover for the hotplate are also interesting accessories introduced herein.

The popular "Newhome" series includes a new cooker with extra large and wide oven, to accommodate the largest size roasting tin or other utensils. This cooker is finished in Nanking blue or water green in addition to grey mottled porcelain enamel. The "Matchless" lighter described is claimed to be both novel and useful. A most important point is that the cost of maintenance is almost negligible.

Among the smaller appliances the "New Argyll" stamped steel hotplate finished grey mottled porcelain enamelled is stated to be unique, as it can be fitted with three alternative combinations of burners. A larger size can now be supplied with two boiling burners and a grill.

Many of the appliances can be supplied suitable for use with Calor Gas. A separate list has been prepared, giving full particulars, which is obtainable upon application.

Athletic and Social

Dougall's Gas Meters, Ltd. : Employees' Outing.

To the number of fifty, employees of Dougall's Gas Meters, Ltd., visited Eastbourne on Saturday, June 20. Leaving Victoria early in the day, the party, who travelled in reserved saloons, arrived at Eastbourne shortly after nine. Luncheon was taken at the Scotch Restaurant. The Loyal Toast having been proposed by the Chairman, Mr. R. V. Steed (Managing Director), Mr. G. Sage proposed "The Firm and Directors." The response was made by Mr. Steed. Mr. H. Telford proposed "The Visitors," and responses were made by Major A. Goodall and Mr. E. R. Mudd. "The Stewards" was proposed by Mr. H. Madell and responded to by Mr. H. Lowther. In the afternoon there was a boat trip to Hastings. On their return to Eastbourne the party were entertained at tea by Mr. Steed. Glorious weather favoured the visitors.

The Ceramic Society

In connection with the Clay Convention in London, there were meetings of the Refractory Materials Section and the Building Materials Section of the Ceramic Society, and as usual Papers read and discussed embodied the results of recent research on certain subjects of more or less interest to all concerned with high temperature heating operations.

A Paper entitled "Barium Aluminium Silicates as Refractories and Their Uses for Different Technical Purposes" was contributed by Dr. Felix Singer. One of these barium aluminium silicates called barium-anorthite is highly refractory, and has a composition similar to that of the variety of felspar known as anorthite, the lime of the latter being replaced by barium oxide. The refractoriness is very appreciably reduced by the presence of comparatively small quantities of impurities, and the presence of free silica has a similar effect.

Barium-anorthite bricks have so far been found useful more particularly as refractory materials for furnaces in which aluminium is to be re-melted for making alloys or for casting blocks. With ordinary refractory materials melted aluminium reduces silica to silicon, and the latter is dissolved by the aluminium or its alloy, involving serious changes in physical properties. The author found that barium-anorthite bricks within certain limits of composition are not attacked by the melted metal. These barium-anorthite bricks have a specific gravity of 3·3, they are resistant to salt glazes and impenetrable to X-rays, and have a much smaller coefficient of expansion and much greater impact strength than most other refractories, as well as a high resistance to many very aggressive chemicals. The possession of such a remarkable combination of properties suggests that the materials might well be used advantageously in other directions in which they have not yet been tried.

A Paper by Dr. T. Swinden and Dr. J. H. Chesters on "The Properties of Open-Hearth Furnace Checker Bricks" was read by the latter. For this the very brief abstract drawn up by the authors may suffice to indicate the chief results of the research and their implications.

A strong similarity has been found in such of the physical properties of fireclay and semi-silica bricks as would affect their use in open hearth furnace checkers.

A comparison of the properties of used and unused checker bricks suggests that provided the bricks are unglazed and can readily be freed from dust, they can be re-used without any loss in operating efficiency.

Analyses of steel furnace checker dusts and of samples of slagged brick indicate that iron oxide (45%) and lime (10%) are the principal corroding materials, but that other oxides, notably those of sulphur, zinc, and the alkalis, may be present in very considerable amounts.

The problems involved in choosing between the various shapes and arrangements of checker bricks are commented upon.

A Paper by H. V. Allen, of exceptional interest and importance, was read by the Author, the title being "Hot Face Insulation." The application to furnace walls of external linings of diatomite (infusorial earth) had resulted in substantial economy in furnace practice, but contraction of the material when heated, which begins at about 800° C., resulted in closing of the air pores and consequent loss of insulating power; while if exposed to actual flame such a highly siliceous material would be liable to spalling because of the rapid fluctuation of temperature.

After much investigation, a material has been produced which combines high refractoriness with good insulating properties, and low conductivity of heat with low heat capacity in the brick. The Author gives results of tests to illustrate these effects.

Hot-Face Insulation Bricks.

The bricks used for hot-face insulation are characterized by the possession of very small pores and a porosity of the order of 75%. The bricks are burnt at a high temperature so as to give minimum after-contraction, and have a high melting point near 1,700° C. The high porosity is consistent with low heat capacity and the fineness of the pores with the very low thermal conductivity. Such bricks also resist spalling better than bricks with large pores and better than most solid bricks.

The chemical composition of the fireclay is given as 65·3% silica, 23·1% alumina, and 6·50% loss on ignition.

The combination of a high refractory property and valuable insulating property in one material enables insulation to be put to its maximum advantage and to serve the dual purpose of reducing radiation losses through the wall and heat absorption losses in the wall.

The thermal efficiency of a fireclay insulator being in the same order as that of diatomaceous insulators, the net efficiency in respect of reducing radiation losses depends upon a simple comparison of capital and maintenance costs against performance. A table is given exhibiting "Heat Balance of Typical Furnaces," including gas-fired, coal-fired, coke-fired, and oil-fired furnaces, and a gas-fired producer.

Details, including definite numerical values, are given to illustrate the advantages derived from hot-face insulation in various industries. Hot-face insulation has proved to be very valuable in heat-treatment furnaces, normalizing furnaces, bogey platforms, recuperator and regenerator chambers, waste-heat flues, producer gas flues, suspended arches, &c.

Fireclay insulating bricks are used largely in boiler settings, and in small oil-fired boilers of the domestic heating type. The hot-face insulation brick can be cut by hand to the many intricate shapes required.

In heat-treatment furnaces the life of the insulating brick is about the same as that of firebrick, with a very considerable economy amounting to as high a value as 50% of the fuel used.

An example is a gas-fired annealing furnace, operating at approximately 750° C. An old furnace was replaced with one equipped with latest controlled devices and with walls built of insulating refractory, with a non-refractory insulation backing; it might be said that no expense was spared in providing a maximum of insulation.

The following interesting results were obtained:

—	Old Furnace.	New Furnace.
Heating up to 750° C.—		
Time	4 hours	1 hour
Gas per hour	1,000–1,200 cu.ft.	700–800 cu.ft.
Total gas per heating	Say 4,500 ,,	Say 750 ,,
Six heatings per week	Say 27,000 ,,	Say 4,500 ,,
Saving	22,500 ,,	or 83·3 %
Maintaining at 750° C.—		
Gas per hour	750 cu.ft.	350 cu.ft.
44 hours per week	33,000 ,,	15,400 ,,
Saving	17,600 ,,	or 53·3 %
Gas consumed per week—		
Heating up	27,000 cu.ft.	4,500 cu.ft.
Maintaining	33,000 ,,	15,400 ,,

Compared with a total weekly consumption of 60,000 cu.ft. in the old furnace, only 20,000 cu.ft. is required in the new furnace, a remarkably economic result both in total and ratio.

Over one-half of this saving, 22,500 cu.ft. or 56·25% of the total saving, is the direct result of using hot-face insulation.

Of the possible economies which could be effected, 83·3% of losses due to heat absorption are eliminated, an exceptionally good result. Approximately 53·3% of the radiation losses no longer occur.

The net financial outcome of the furnace replacement was that the fuel economies paid for the new equipment in 15 to 18 months. In addition, throw-outs were reduced from 1 to 2% to negligible.

The brick is resistant to attack by carbon monoxide, and therefore can be used in producer gas mains. It has also been successfully and quite extensively used for flues to waste-heat boilers.

Several other Papers were presented, but these were either of limited technical interest or not adapted for useful abstraction. Three Papers were communicated by title, and these will be printed in the Society's Transactions in due course.

Hon. Secretary, W. A. Howie, and President, R. J. H. Clark.

Southern Association of Gas Engineers and Managers

Summer Meeting at Plymouth

Members of the Southern Association of Gas Engineers and Managers, and their ladies, were the guests on Tuesday, June 30, of the Plymouth and Stonehouse Gas Light and Coke Company, in charge of whose Works is their President, Mr. R. J. H. Clark.

Evidence of the well-known West Country hospitality was never more marked than on the occasion of the Southern Association's visit to their President's headquarters; and the entertainment provided by the Plymouth and Stonehouse Gas Light and Coke Company will long be remembered in the annals of the Association. Indeed, no pains were spared by the Company to make the visit an enjoyable and memorable one—and all who took part will agree that they admirably succeeded.

During the morning the members inspected the gasworks, where they were enabled to witness at first hand many of the interesting things which had been previously outlined to them by Mr. Clark in his Presidential Address. The Company's travelling showroom, which was mentioned and illustrated in Mr. Clark's Address, was drawn up in the works yard, where it was viewed with much interest.

Luncheon with the Company.

The tour of the works concluded, the members repaired to the Royal Hotel, while the ladies were entertained at the Grand Hotel by Mrs. R. J. H. Clark, to whom a hearty vote of thanks was accorded subsequently for the kind hospitality extended to them.

At the Royal Hotel luncheon was taken at the invitation of the Plymouth and Stonehouse Gas Light and Coke Company—Colonel R. L. NORRINGTON, C.M.G. (Chairman and Managing Director), in the Chair.

The Loyal Toast having been duly honoured, Colonel NORRINGTON proposed the Toast of "The Southern Association and Visitors." He extended at the outset a cordial welcome to all those present. Speaking not only as a "gas man," but also as one who had been engaged for a considerable period in ordinary competitive industry or trade, he sometimes wondered whether "gas men" fully appreciated the difference that existed between associations such as theirs and the ordinary trade associations such as he had had to deal with during most of his business life. In the ordinary trade association there was bound to be a certain amount of reserve between members; it was not always wise or politic to discuss certain matters with one's competitors; it might be necessary to hold back certain information. But the fortunate members of the Gas Industry did not suffer from this handicap; they could be—and were—absolutely frank and candid with one another—and that made an extraordinary difference in the pleasantness or otherwise of one's business. That was why he said they were very lucky, and that was the reason why associations such as theirs had been so very successful in providing interchange of ideas and information which lead to greater efficiency all round. In that connection Colonel Norrington said he would like to thank many of the undertakings of members of the Association for the acts of kindness which members of the Plymouth Company's staff had received whenever they wanted to obtain any information or take advantage of the experience of others.

The Southern Association, he continued, had distinguished itself by supplying this year the President, the Senior Vice-President, and the Junior Vice-President of The Institution of Gas Engineers. He was sorry it was not possible for the President and the Senior Vice-President to be with them on that occasion; but they were very glad that the Junior Vice-President was able to be present.

An Expression of Thanks.

The PRESIDENT (Mr. R. J. H. Clark), in responding to the Toast, said that he had the honour, on behalf of the Southern Association of Gas Engineers and Managers, to express their very sincere thanks to the Chairman and Directors of the Plymouth and Stonehouse Company for their kind invitation to Plymouth, for their generous hospitality, and for the cordial welcome the members had received. He assured the Chairman that the very kind manner in which he had proposed the Toast was thoroughly

Messrs. R. Robertson and C. F. Botley Inspect the Travelling Showroom.

appreciated by everyone. The fact that their work was appreciated by the employers of the officials who went to make up the members of their Association was very encouraging and was an incentive to further effort. They greatly regretted the absence of Mr. S. Lacey and Mr. H. C.

Smith, and he recalled with great pride the admirable manner in which Mr. Lacey had handled the duties which fell upon him at very short notice during the recent Institution Meeting in London by reason of the regrettable illness of the President, Colonel W. M. Carr. They were very glad to have Mr. Robertson, the Junior Vice-President of the Institution, with them on that occasion, and they would take this opportunity of congratulating him upon his well-deserved election. In conclusion, Mr. Clark once again thanked his Directors for the unstinted support which made it possible for him to take the Presidency of that Association.

Mr. R. ROBERTSON (Bristol), Junior Vice-President of The Institution of Gas Engineers, observed that he greatly appreciated the honour of also responding to this Toast. On behalf of the visitors he thanked the Chairman very much for the Toast he had proposed in such happy terms; they all appreciated the Company's welcome very much indeed; they had given them a first-class busman's holiday that morning. They had shown them what they were doing at Plymouth to face up to the problems of the day.

There was a tendency for undertakings to-day, went on Mr. Robertson, to expect the Government to assist them in their operations; he might quote the coal and agricultural industries as examples. But the Gas Industry, on the other hand, provided a very good instance of how an industry could look after its own affairs—and do so successfully in spite of Government interference. He thought the occasion was fitting to pay tribute to the National Gas Council for the strenuous efforts they had made to ensure a fair deal not only for their own Industry, but for every consumer of coal. But however valuable such National associations were, there were some things they could not do for local industries. The Plymouth Company had shown them how they met local problems; their Works were in first-class condition, while they had organized their sales side and affairs generally in order to meet the conditions ahead. They congratulated them upon their efforts and also on their officials. In one year the Plymouth Company had supplied two Presidents—one to the Southern Association of Gas Engineers and Managers and the other to the Western Junior Gas Association. In the name of the visitors he wished them success and prosperity in the future.

Two Excellent Presidents.

Mr. S. E. WHITEHEAD (Southampton), Vice-President of the Association, proposing the Toast of "The Plymouth and Stonehouse Gas Light and Coke Company," remarked that this Undertaking had supplied their Association with two excellent Presidents—namely, Mr. P. S. Hoyte and Mr. R. J. H. Clark. It was the Association's unanimous wish that Mr. Clark should become their President. But without his Directors' permission he could not have accepted the office. They were therefore very grateful to them for allowing him to do so. They were also extremely grateful for their entertainment that day. They thought a great deal of the Plymouth and Stonehouse Company, because ever since they had been in the Industry Plymouth had been a place that mattered in the Gas Industry; and they were very pleased to see that it still mattered. They knew from various addresses and reports that Plymouth was going ahead in no uncertain manner. The report of their recent Annual Meeting was sufficient to indicate that Plymouth was now in the front rank of the Industry. The Company had created a record for gas sold, for coke sold, and for appliances sold; that showed there was a great deal of "kick" in the Undertaking. Moreover, most of them would envy them the price at which they were able to sell their gas. Hundreds of miles away from the coalfields, it was a great achievement, and many of them would like to emulate it.

The Chairman.

It had been interesting to follow up the Presidential Address and see the very fine Gas-Works; and they hoped that their President and Colonel Norrington would have many years before them in which to steer the Company into even greater prosperity. In conclusion, Mr. Whitehead referred to the kindness of the Directors for including the members' ladies in the invitation. Both the members and their ladies greatly appreciated this. He coupled with the Toast the name of Colonel Norrington, who had been Chairman and Managing Director of the Plymouth Company for eight or ten years—and they therefore claimed him as a "gas man" of the first rank.

Colonel NORRINGTON, in acknowledging the Toast, thanked Mr. Whitehead for his kind references to himself and the Plymouth Company. They had been, he could assure them, genuinely pleased to be able to afford them a cordial welcome on that occasion, and any little trouble that they had had—and it was very little—had been more than amply repaid if the members had enjoyed themselves.

A final Toast to the Chairman was cordially given on the call of Mr. C. F. BOTLEY (Hastings), after which the members joined the ladies on the Promenade Pier to embark for a cruise.

With the Southern Association at Plymouth. Extreme right Mrs. R. J. H. Clark.

The River Cruise.

A large and comfortable motor vessel had been chartered by the Plymouth Company for the visitors, and a most entertaining four-hour cruise followed. The route took the visitors past the Naval Dockyards and enabled them to see a number of warships at close quarters, together with a large aircraft carrier, and also the floating dock. Passing under the famous Saltash Bridge the vessel left behind the scenes of activity in the dockyards and proceeded up the beautiful estuary of the River Tamar amidst the most delightful scenery. A short halt was made some way up river at a fascinating little waterside village called Cargreen, on the Cornish side, and most of the party landed to take a stroll up the steep village street and see the quaint little cottages that line it. Tea was served on board, and the boat tied up again at the Promenade Pier about 6.45 p.m. after a most enjoyable and interesting cruise—and here the visitors took leave of Mr. and Mrs. Clark and other members of the Plymouth Company with many expressions of thanks for a memorable day.

Manchester District Association of Gas Engineers

On Friday, July 3, the Association held its Summer Meeting at Manchester, where the President, Mr. A. L. Holton, is Chief Engineer of the Corporation Gas Undertaking. More than 100 members took part.

The President, with his Chairman, Councillor W. P. Jackson, J.P.

Visit to Bradford Road Gas-Works.

In the morning a visit was paid to the Bradford Road Gas-Works of the Manchester Corporation and to the sales and service depôt at Gleden Street, Manchester.

The last occasion on which the Manchester District Association of Gas Engineers visited the Bradford Road Works was in March, 1922, when extensions to the carbonizing and ancillary plant were nearing completion. The members had now an opportunity of inspecting the completed Works, and it is interesting to review the various stages of its development.

In 1869 statistics were presented to the Manchester City Council showing the necessity for acquiring land for the purpose of building a new Gas-Works. In 1876 an advertisement appeared in the Press inviting plans for a new Works, premiums of £500, £300, and £200 being offered.

The instructions issued to competitors stated, *inter alia*, " the intended Works should be divided into four portions, each complete within itself, and capable of being erected separately, the aggregate of which must be capable of producing, purifying, measuring, storing, and delivering into mains immediately outside the Works, not less than 20 million cu.ft. of gas in 24 hours."

The adjudicators were Messrs. Hawksley and Livesey, of London, and Mr. King, of Liverpool, who awarded the first premium to Messrs. Mangnall & Littlewood.

The foundation stone was laid by Alderman Hopkinson on Oct. 11, 1877, and during the years from 1878 to 1881 four 1¾ million holders, a governor house, an engine house, and a boiler and boiler house were erected. From 1882 to 1884 two retort houses were built, capable of producing 3½ million cu.ft. per diem, together with the necessary ancillary plant. The types of settings adopted were Klönne, West's, and Siemens.

Gas making was commenced on Dec. 16, 1884.

Offices were built and purifiers extended during 1890-1895, and four sets of C.W.G. plant were erected, each capable of producing ¾ million cu.ft. of gas per diem, and in addition a 7 million cu.ft. holder was constructed. During 1898-1900 four ¾-million sets of C.W.G. were added to the existing installation, while by-product works were erected for the manufacture of sulphate of ammonia and sulphuric acid. An experimental plant was also erected for the purpose of testing coals, &c. This work is now carried out at the Droylsden Works, which has a production capacity of ¾ million cu.ft. per diem. During the period 1909-1912, four ¾-million C.W.G. sets were remodelled and the capacity increased to 1¼ million cu.ft. per diem. The C.W.G. plant is now out-of-date, and is used only for emergency loads. A 10 million holder was also erected.

There was further development of the Works during 1914-1918, while in 1919-1923 the Works were extended again by the addition of two units of vertical retorts, each having a nominal capacity of 4 million cu.ft. per diem, together with the necessary ancillary plant. A rearrangement of the existing plant was also undertaken so as to form a unified Works. The erection of a waterless holder of a capacity of 5 million cu.ft. was undertaken in 1929, and in 1933 a benzole extraction and rectification plant was installed.

The Works were completed in 1936. The gas from the

A Group taken at Bradford Road Works.

respective installations is separately treated until it reaches the outlet of the meters, thus enabling individual costs to be prepared of each of the carbonizing units.

There are four retort houses—namely, "A" Retort House, which is equipped with Drakes' horizontal settings, Fiddes-Aldridge and Drakes' charging machines, and Drakes' coke transporters, and has a producing capacity of 4½ million cu.ft. per diem. "B" Retort House, equipped with Drakes' horizontal settings, stoking machines, and coke transporters, has a producing capacity of 3½ million cu.ft. per diem, and incorporates two Trefois producers. "C" Retort House is equipped with Woodall-Duckham vertical retorts. It has a producing capacity of 4½ million cu.ft. per diem. "D" Retort House, equipped with Glover-West vertical retorts, is capable of producing 4½ million cu.ft. per diem.

The further-mentioned plant was also installed:

C.W.G. Plant.—Humphreys & Glasgow. Producing capacity, 6 million cu.ft. per diem.

Condensers.—Five sets of vertical tubular water-cooled type (Dempster). One set (Clapham).

Exhausters.—Six sets Bryan-Donkin 4-blade type.

Washing Plant.—Six P. & A. tar extractors, four Holmes rotary washers, two Kirkham washers, four Livesey washers, and four Holmes benzole washers.

Purifiers.—Both water-sealed and luteless type.

Steam-raising Plant.—Five water-tube Stirling boilers, fitted with underfeed stokers.

Compressors and Condensing Plant.—Two 1,000 cu.ft. per minute (Browett Lindley), one 2,000 cu.ft. per minute (Browett Lindley), and one 4,000 cu.ft. per minute (Bryan Donkin).

Boosting Plant.—Two sets of steam-driven turbines and fans (Bryan Donkin), each capable of passing 750,000 cu.ft. of gas per hour. This plant was originally erected at the Gaythorn works.

Gasholders.—One 7-million, 4 lift, column guided, one 10-million, 4 lift, column guided, and one 5-million (waterless).

Benzole Plant.—Simon-Carves, in two separate units, horizontal and vertical.

By-product Works.—Works for the manufacture of sulphuric acid and sulphate of ammonia.

The Works now extends over an area of 53 acres.

The Gleden Street Depôt.

The Gleden Street depôt occupies a site of approximately 5,085 yd., and was acquired in 1909. The main building was formerly a cotton mill, to which a two-storeyed wing has been added.

The depôt is used for the re-conditioning of cookers, fires, radiators, &c., and for that purpose the following plant has been installed: One Tilghman's sandblast chamber, 12 ft. square, with air-compressing plant, capable of delivering 600 cu.ft. of air per minute at a pressure of 20 lb. per sq.in., and with automatic shot mixer and dust separator. There are also two glazing machines, two polishing lathes, and one electro-plating and tinning plant. A varnish-spraying plant has been installed, with compressors capable of delivering air at 80 lb. per sq.in. to filters attached to each of six spraying booths. Filters extract all moisture from the air and allow for adjustment of pressures on the spraying guns. Each booth is ventilated by an extracting duct capable of changing the air in the booth twice per minute. Consequently all vapours and dust are instantly drawn away from the operators. There are two stoving ovens, one of which is maintained at a temperature of 250° F. by the waste heat from a compressor. The second is direct gas-fired and maintained at a temperature of 350° F. by thermostatic control.

A conspicuous feature of the depôt is a Brayshaw gas-fired natural draught furnace, 9 ft. by 4 ft. 6 in. by 3 ft. 6 in., operating at a temperature of 470° C. It is capable of burning off approximately 100 cookers per working day of 8½ hours.

During the year ended March 31, 1936, the following appliances were renovated: Cookers, 17,785; fires, 2,448; radiators, 432; wash boilers, 2,156; articles tin-plated, 6,567; Articles nickel-plated, 8,443; and the number of brass fittings cleaned was 108,296.

LUNCHEON.

Subsequently, the members of the Association were entertained at luncheon on the kind invitation of the Chairman and Members of the Manchester Corporation Gas Committee in the Manchester Town Hall. Councillor W. P. Jackson, J.P., Chairman of the Manchester Corporation Gas Committee, presided.

Among those present were the Rt. Hon. the Lord Mayor of Manchester, Alderman Thomas S. Williams, J.P., Mr. Stephen Lacey, B.Sc., M.Inst.C.E., President of The Institution of Gas Engineers, Alderman Sir William Kay, J.P., Alderman T. Cook, Sir Frederick J. West, C.B.E., Alderman Sir William Davy, and Mr. J. B. L. Meek, Manchester City Engineer.

The Loyal Toast having been proposed by Councillor W. P. Jackson, J.P., was duly honoured.

The Lord Mayor of Manchester proposed "The Manchester District Association of Gas Engineers," stating that he scarcely understood in what capacity he was appearing in relation to an association of gas engineers. It was, however, an association of undoubted long-standing in so far as it had existed since 1870, and in that respect it was a few months older than himself. He wished to refer to a name which had always been regarded with high esteem in Manchester gas circles—the name of Newbigging. There had been two gentlemen of that name who had been Presidents of the Association, Mr. Thomas Newbigging, D.Sc., M.Inst.C.E., and Mr. J. G. Newbigging, M.Inst.C.E. Both those gentlemen had done a great deal to create an honourable status for the Association, and both of them knew how to produce gas in the best possible way at the lowest possible cost. Mr. Thomas Newbigging was one of the pioneers of the Industry.

The Manchester Corporation Gas Committee had certainly been generous to the Manchester ratepayers for they had altogether contributed approximately 3½ millions sterling in aid of the rates, for which the "poor" ratepayer—he was always "poor"—was no doubt correspondingly grateful. If only the other public utility undertakings, such as electricity and water, would contribute similarly probably the ratepayers of the City would begin to think that their affairs were managed by capable administrators.

Mr. A. L. Holton, President of the Association, responding, said that on such occasions, when the Association visited the Works of the authority or company of whom their President was an official, it could rightly be considered to be the "President's Day." He would look back upon the present occasion with particular pleasure. As a matter of fact, he had commenced the day well, for looking at the calendar for the motto which should guide him throughout his waking hours, he read: "Those who believe in romance can find it in a gas-works if they have a mind." [Laughter.] They were very happy to welcome the Lord Mayor in his capacity as Chairman of the Public Lighting Committee.

They were fortunate to be able to welcome as their guest Mr. W. B. McLusky, who was now the President of the Waverley Association of Gas Managers. It was also a great pleasure for him to learn that Col. W. M. Carr, the Engineer and Manager of the Stretford Gas Undertaking, had successfully undergone his second operation and was making a speedy recovery. He had sent a message wishing the members a very pleasant meeting. He had also received an expression of good wishes from Mr. R. Halkett, General Manager of the Sheffield Gas Undertaking, which he, the speaker, had had the honour to serve before coming to Manchester.

Aided by its professional Associations the Gas Industry had ever marched forward, its progress being continuous both in outlook and in the number of its consumers, the latter having increased by over 28% during the past ten years. Other industries had also benefited by the efforts put forward by the Gas Industry, and the Coal Industry must be counted among the number. At the present time, public utility undertakings were being largely blamed for the unsatisfactory state of the mining industry, it being alleged that they were purchasing coal too cheaply. A careful perusal of the Annual Report of the Secretary for Mines revealed that there was no foundation for such a statement. As a matter of fact, the Coal Industry had benefited very considerably by the activities of Public Utility Undertakings, and the Samuel Report, 1925, urged their closer relationship, stating: "Mining, in many places should be intimately associated with several other industries—gas, electricity, smokeless fuel, oil, chemical products, blast furnaces, and coke ovens."

It was evident, therefore, that the industries enumerated were accounted inter-dependent. The scientific and technical research into the treatment and use of coal was of very vital importance to the mining industry.

The Gas Committee of the City of Manchester had given unstinted support to furthering the interests of the Gas Industry. It had always encouraged pioneer and research work, and it was a matter of interest that Mr. John West, who was for some time Chief Engineer of the Manchester Undertaking, developed the West's Charging Machine at

the Works visited that morning. Also, at the same Works, the first Trefois Producer was erected prior to its final selection for the Partington Works. A former Chief Engineer, Mr. John Newbigging, took an active interest in the early development of the Glover-West Vertical Retort, and the first large installation was erected at Rochdale Road Works in 1912.

"The Manchester Gas Committee."

Mr. STEPHEN LACEY (President of The Institution of Gas Engineers), in proposing "The Chairman and Members of the City of Manchester Gas Committee," was particularly pleased to be present because, as President of the Institution, he naturally wished to meet as many members of the Industry as he possibly could on their own ground during his year of office. The best way of doing so was to attend the meetings of the District Associations which were affiliated to the Institution and represented on its Council. He counted himself fortunate that his first visit as President of the Institution should be to attend a meeting in Manchester itself, with his friend Mr. Holton in the Presidential Chair of the Association.

The Manchester District Association had a great record of pioneer work and achievement. No one to-day could fail to realize how necessary it was that gas engineers and managers, especially those in adjoining districts, should get together to discuss their common problems, but this did not seem to be so obvious years ago. It was not so obvious in 1870, and therefore the Manchester District Association was proud of the fact that it was established in that year. It might fairly claim that its example helped to foster that unity of purpose and spirit of co-operation which made possible the formation of the great National Associations which exist at the present day. There was, of course, much remaining to be done in the same spirit if they were to continue to meet successfully the challenge of their State-favoured and State-organized rival.

The Lord Mayor had mentioned that the two Newbiggings were Presidents of The Institution of Gas Engineers. Another remarkable record of a similar kind was that at the present day there were as members no less than six Past Presidents of the Institution—namely, Messrs. Bond, Shadbolt, Tagg, Wilkinson, Shapley, and the immediate Past President, Col. W. M. Carr, for whom they all wished a speedy return into their midst.

He had been accorded the great honour of proposing the toast of their hosts. That those gentlemen had entertained the Association in such a remarkable way was gratifying evidence of their appreciation of the work done by the Association, and of the high regard which they held for their General Engineer, Mr. Holton.

He had spent a most pleasurable morning in going round the Bradford Road Works. He had seldom seen a works with such a fine lay-out as that at Bradford Road, nor one which was kept in such an orderly way.

Mr. R. N. WEBB (Senior Vice-President of the Manchester District Association of Gas Engineers), in supporting the toast, was sure he was expressing the pleasure of all those present, as well as his own, at the fact that Mr. Lacey was present among them. Mr. Lacey was a very busy man, and he had been particularly busy recently, so that there had been some doubt as to whether it would be possible for him to attend the Meeting.

He regarded it as a great privilege to be a member of the Manchester District Association of Gas Engineers, which was the eldest of the English Associations. It owed its formation to a meeting of Gas Engineers to honour the late Thomas Newbigging, D.Sc., on his leaving England for Pernambuco, Brazil, in 1870. It was then suggested by Mr. Newbigging that it would be an excellent thing to hold periodical meetings, say, yearly. A Committee was at once formed, and the First General Meeting was held on March 26, 1870. The first President was Mr. Joseph Wood, of Bury, who fulfilled the duties of the office for two years. Upon his return from Pernambuco, Mr. T. Newbigging became President in 1879, and thirty-five years later his son, Mr. J. G. Newbigging, was elected to the office and also served for two years—namely, 1914 and 1915. He, the speaker, believed that the only other occasion on which the Presidential Chair was occupied for two years in succession was when his Chief, Mr. C. S. Shapley (Leeds), was President in 1926 and 1927.

Councillor W. P. JACKSON, J.P. (Chairman of the City of Manchester Gas Committee), in response, said it was quite correct that Manchester did not regard the Gas Industry as dead. Without being unduly optimistic he thought they might anticipate great developments in the Manchester Gas Industry. The Gas Committee were very proud of the fact that the Association had conferred the highest honour which it was within its power to bestow upon their Chief Engineer. The Committee were also duly appreciative of the fact that Mr. Lacey had honoured them with his presence.

Alderman Sir WILLIAM KAY, J.P., proposed the toast of "The Lord Mayor," to which the LORD MAYOR responded suitably.

Visit to Messrs. West's Works.

The Members of the Association then proceeded to inspect the Albion Works of Messrs. West's Gas Improvement Company at Miles Platting.

The machine shops are fitted with up-to-date and efficient machine tools, among which are many special types of the Company's own design and manufacture for the purpose of effecting rapid production of specialities. The structural steel department, familiarly known as "The plater's shop," is possibly the most important section of the Works, where the whole of the structural steel work in connection with the Company's business is carried out entirely under cover. There is a very distinct improvement from the conditions prevailing in the old days, when steel structural work was largely fabricated, stored, and erected in the open, often under very trying weather conditions, and subject to all the rusting and corrosion inseparable from those conditions.

A notable feature of the works is the Research Gas-Works. The inception of a full-scale gas-works in which research work could be carried out under the Company's control dates back at least 20 years, but the realization had to await the more settled times of 1922-1923. When the time for building arrived, much research work had been carried out in Glover-West vertical retorts at St. Helens, Macclesfield, Southport, and Uddingston, and later at the Fuel Research Station. But much remained to be done, and that of a character which could not be effectively achieved except in a plant absolutely under the immediate and prompt control of the makers themselves.

The activities and duties of the Research Department fall into two main categories. (*a*) Testing and running trials on gas-making coals which are used, or proposed to be used, by clients, so that guarantees can be based on real knowledge of the behaviour of the coals carbonized under the conditions of the test. (*b*) Testing-out and developing of all manner of new devices and designs of retorts, producers, extractor gears, coal-feeding apparatus, gas offtakes, and everything else connected with the carbonizing plant.

The laboratory is fully equipped with the most modern apparatus for routine work, and a growing amount of specially devised apparatus for dealing with such problems as present themselves from time to time. The Research Gas-Works also serves a most important function in that it provides a preliminary training ground for the pupils of the Company, particularly in regard to engineering design and the erection and operation of gas-works plant.

The members of the Association were then entertained to tea at the Works.

Vote of Thanks.

The PRESIDENT proposed that a hearty vote of thanks be accorded to the Company for their hospitality, and for their kindness in permitting the members to visit the works. Furthermore, he particularly desired to congratulate Sir Frederick West on the honour which had recently been conferred upon him by the King. Sir Frederick West was an Honorary member of the Association, and they were all delighted to find that so prominent a member of the Gas Industry had been so signally honoured.

Mr. H. BURTON (Shipley), in seconding, heartily congratulated the Company upon the administration of their research work. There had long been an intimate association between Messrs. West and the Gas Industry; in fact, the progress of the one was synonymous with that of the other.

Sir FREDERICK WEST, C.B.E., in responding, expressed the great pleasure he had felt in the fact that the members of the Association had so thoroughly enjoyed their visit to the Works. He also deeply appreciated the congratulations which had been extended to him with regard to the great honour which the King had conferred upon him. This might be said to be the first gas meeting he had attended since that event, and he was gratified to receive the congratulations of the Association a little ahead of that of any other public body. He wanted all the members to feel that he regarded it as an honour which he shared with them all, because he regarded it as an honour to the Gas Industry itself.

LONG SERVICE TO THE GAS INDUSTRY

A number of firms of long standing on the contracting and manufacturing side of the Industry have collaborated with the "JOURNAL" in the production of a series of articles, under the above title.

William Sugg & Co., Ltd.

This business was originally established in Marsham Street, Westminster, in 1837, by William Sugg, the father of the late William Sugg, and the grandfather of the present Chairman of the Company.

An old document shows that in 1838 Mr. Sugg entered into partnership with a Mr. Craswell Jobling and a Mr. William Parsley Pywell "to become co-partners together in the trade or business of Manufacturers of Gas Meters, Brass Founders, Gas Fitters, Smiths, and Engineers."

The capital was £500, and it is of interest to note that by way of remuneration, William Sugg was to receive £3 per week, William P. Pywell £2 10s. per week, and Craswell Jobling 1s. per hour.

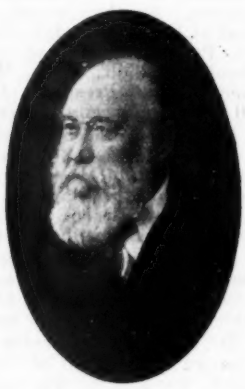
By 1841 these latter gentlemen appear to have dropped out of the partnership, after which William Sugg conducted the business with his son, the late William Sugg, who was born in 1833, and who, in 1858, succeeded to the sole control on the death of his father. The factory was removed in 1866 to a portion of the present site of the works in Vincent Street, Westminster.

William Sugg concentrated his inventive genius on the improvement of gas lighting burners, and it was largely due to his efforts that the efficiency was raised from 0·8 (fishtail burner) to 3 candles per cu.ft. The London Argand burner, introduced in 1869, was adopted by the Gas Referees as the Standard Test Burner for the Metropolis, and in their report dated June, 1869, the burner is referred to in these terms: "This burner of Mr. Sugg's excels all others."

During the first great electrical lighting scare of 1879, Mr. Sugg, who had continued his patient researches in connection with the governed type of flat flame burner, originally designed by him in 1859 for public lighting, rendered signal service to the Gas Industry by the introduction of improved burners for domestic use. These included the "Christiania" flat flame burner in a variety of artistic patterns, which came to have a world-wide reputation. Street lamps of improved types and greatly increased candle-power were designed, which employed either large Argand burners with one or more concentric rings of flame, or clusters of flat-flame burners.

In 1881, owing to the expansion of the business and the need for increased capital, it was found necessary to convert the undertaking into a limited liability company, of which Mr. Sugg was the first Managing Director—a position which he held until his death in July, 1907. The premises were enlarged in 1883 and extensively rebuilt in 1888.

William Sugg, 1843.



William Sugg, Managing Director, 1881-1907.

During the Great War the firm was controlled by the Ministry of Munitions, and its entire resources were applied to the manufacture of armaments, including shell com-

The Original Deed of Partnership.

ponents, bombs, aeroplane tanks, &c., the great demand for which led to the acquisition of Ranelagh Works, Chapter Street, Westminster.

After resumption of normal business in 1919, the increased demands for the Company's products necessitated the acquisition of a further works at Angel Road, Edmonton, and the erection of a large new building in the rear of the premises in Regency Street, Westminster.

The house of Sugg celebrates its Centenary next year, and the history of the firm is synonymous with the record of progress in the harnessing of coal gas to the service of mankind for lighting, heating, and cooking.

The pioneer spirit of invention and enterprise which characterized the first William Sugg a hundred years ago has dominated the house ever since, and is to-day still as vigorous. One hundred years ago the illumination provided by the crudely designed burners, then available, was of a very low order, and for some years only minor improvements were made until, as already stated, in 1869 Sugg introduced an Argand burner for domestic use, together with the "Christiania" flat flame governor burner. These held sway for a considerable period, until the invention of the incandescent mantle by Welsbach, which revolutionized gas lighting.

Sugg, realizing the immense possibilities of this form of lighting, designed many lamps and fittings to make full use of this new discovery, including the "Newark" lamp with upright mantles. Later, when the inverted type of mantle had been perfected, the "Regent" lamp, with clusters of the "Universal" mantle, was produced.

The War temporarily prevented any further progress in this industry, as in many other industries, but immediately after attention was again focussed on the designing of

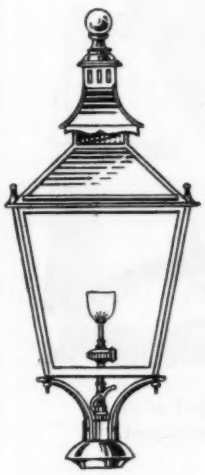
Philip H. Sugg,
Present Chairman and Joint Managing Director.

William G. H. Mattock,
A.M.I.Mech.E., Present Joint Managing Director.

lamps employing small mantles (bijou or No. 2) on superheaters, resulting in the development of the "Littleton" and "Rochester" lamps, which have enjoyed, and continue to enjoy, immense popularity, many important installations throughout the country having been equipped with lamps of this type.

In recent years the development of public lighting has been continued along the lines of scientific and efficient re-

The Evolution of Public Lighting

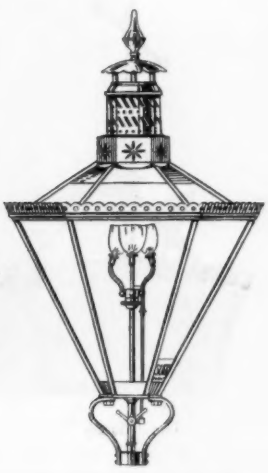


The "Nictheroy,"
1865.

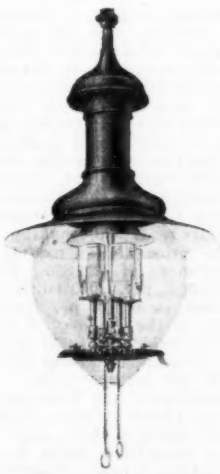
1869.

1875.

1878.



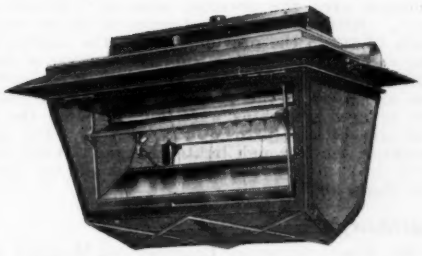
The "Lambeth,"
1879.



The "Newark,"
1907.

The "Regent,"
1909.

The Upright
"Rochester."



The "London" Lamp—
most popular present-day lamp.

direction of the light in connection with which the house of Sugg has taken a leading part, their latest production, the " London " lamp, with its remarkable system of mirror reflectors, supplying a most efficient unit to combat the competition of modern electric lighting systems.

Among the many fittings designed to meet modern requirements for indoor lighting may be mentioned the " Bon Marche " and " Salon " for the interior of business premises and the " Grand " and other pendants with switch control, and numerous attractive brackets and standard fittings for purely domestic lighting.

The " Christiania " Burner.

On the heating and cooking sides many notable contributions have been made to the Industry. The " Charing Cross " gas fire was introduced as long ago as 1860 and was the forerunner, through numerous stages, of the popular " Red Sphinx " of to-day with its incurved fuel formation. The year 1860 also shows the first record of the manufacture of cookers, and ever since the firm has had an enviable reputation for all forms of special cooking apparatus, as well as for a number of standard models—the " Westminster," " Berkeley," and " Eton " being a few names which occur.

The late William Sugg was one of the pioneers in the design and construction of photometrical apparatus for testing the quality of gas then determined in terms of candle-power, and his services were in constant demand as a technical witness in connection with Gas Bills presented before the Committees of the House of Lords.

The long experience gained in this particular branch of the Industry has been embodied in the equipment employed in the present Photometrical Research Laboratory which has been specially designed for the rapid and accurate testing of lighting units. The service of this Laboratory, which ranks among the most modern and complete in the country, is always available for the use of gas engineers, together with the assistance of the technical staff, who are pleased at any time to co-operate in the preparation of lighting schemes.

The " Salon "

The " Bon Marche."

The Mirror Head which is part of the present-day photometrical equipment.

Gas Undertakings' Results

Colne.

The Engineer's Report for the year ended March 31, 1936, on the Colne Gas Undertaking states that the expenditure on revenue account was £41,489 and the income £51,482, leaving a gross profit of £9,993. The net profit was £1,810, which has been placed to revenue appropriation account. During the year 11,580 tons of coal was carbonized. The quantity of gas made per ton of coal carbonized was 20,349 cu.ft., compared with 20,958 cu.ft. for the year 1934-35. The total quantity of gas manufactured during the year was 235,652,000 cu.ft., an increase over the previous year of 5,093,000 cu.ft.—equal to 2·2%. Residuals to the net value of £6,564 were sold compared with £5,547 in the previous year. The number of consumers at the end of March taken from the number of meters in use was 9,011, an increase of 34. There are 3,263 ordinary meters in use and 5,748 of the prepayment type. During the year 2,125 yd. of new gas mains were laid, bringing the total mileage in the area of supply to 59 miles 365 yd. The number of public lamps in the Borough lighted by gas is 1,239, an increase of 39 over last year. The gas consumed for this purpose was 24,744,000 cu.ft.

Edinburgh.

Mr. James Jamieson, Engineer and Manager of the Edinburgh Gas Department, reports that the accounts for the year have now been completed and notwithstanding the substantial reduction made in the price of gas to both ordinary and prepayment consumers during the year a satisfactory surplus is shown. The total expenditure amounted to £545,201 and the gross revenue to £689,012, making a gross profit of £143,811. After meeting interest and sinking fund charges amounting to £94,050 and income-tax of £22,736 the Department have a net surplus of £27,025. It should be pointed out that during the year items of a special character were paid from revenue: (1) Special contribution towards the depreciation of meters and cookers, £14,250; (2) the voluntary 1s. per ton paid on outstanding coal contracts, £4,000; (3) office machinery and sundry plant, £2,000; (4) contribution towards the cost of reconstructing the Waverley Market, £5,000; and (5) special grant to Lighting Department for the modernizing of gas street lighting, £2,500, making a total of £27,750. The reduction in the price of gas meant a falling off in the revenue to the Department of £28,380. The average price received for gas was 2s. 6·36d. per 1,000 cu.ft. or 6·39d. per therm compared with 2s. 8·19d. or 6·77d. per therm during 1935. This is the lowest price in the history of the Undertaking, the pre-war price being 2s. 7·3d. per 1,000 cu.ft. The gas sent out was 3,935 million cu.ft. compared with 3,717 million cu.ft. for 1935, an increase of 217 million cu.ft., or nearly 6%. A record number of appliances has been purchased and fitted. These include over 10,000 cookers, 3,500 hotplates, 3,700 heating appliances, 650 water heaters, and 40 refrigerators. Nearly 6,000 cookers in enamelled finish have been supplied for cash or on hire-purchase terms. Notwithstanding the increased price in coal it is proposed that no increase should be made in the present rates charged for gas.

The B.K. Vacuum Governor

By B. R. PARKINSON, M.I.Mech.E., Hon.M.Inst.Gas E.

The difference between an ordinary pressure governor and a retort house governor is that the one controls pressure on its outlet and the other on its inlet. Either may be set to control pressure or vacuum, and if the term "vacuum" be used for convenience in referring to a retort-house governor, it is merely because the controlled pressure is more often below atmosphere than above.

All gas governors comprise two elements, the one consisting of a liquid-sealed bell or a diaphragm subject to the influence of the gas under control, and the other a valve. The variations in the means by which the bell or diaphragm operates the valve can be again classified under two headings, the simple or direct type and the "relay" governor.

In the simple type the bell or diaphragm works the valve *directly* and in the so-called "relay" type it works the valve *indirectly*, employing some auxiliary power. This latter may be extraneous, involving the use of water power, compressed air, or an electric motor; high pressure gas can be employed or even gas at holder pressure. The Reynolds type of governor uses its own ungoverned gas as a "relay." In one of the latest patented governors employing electric power, the motor is controlled from the gas diaphragm by a photo-electric cell.

In order to understand quite clearly why it has been thought necessary to introduce external or "relay" power for the overcoming of friction in the operation of a governor, we must realize that the ordinary type governor, whether pressure or vacuum, in so far as it is required to maintain a perfectly straight line on its chart, has no reserve power for operation. If there be any friction or inertia to overcome, this must be at the expense of the governed pressure—that is to say, if one-tenth inch pressure be required to move the valve either one way or the other, that one-tenth pressure will show as an error on the chart.

This disability of the simple type of governor is emphasized when we are dealing with unpurified gas in the retort house owing to the possibility of tarry deposits hindering the movements of the valve. Nevertheless, the B.K. governor which is the subject of this article is just of that simple type and it has been produced to meet a demand arising from engineers who, while appreciating the merits of the relay system, do not favour its complications.

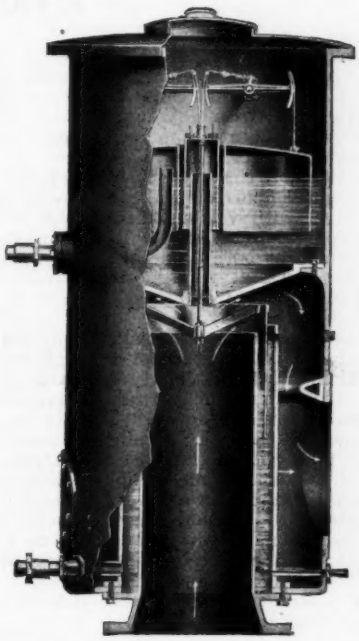
In order to utilize this simple type of governor, which has no reserve power in itself and no outside aid for the overcoming of resistance, it must be constructed so as to reduce the sources of resistance and inertia to such a minimum as to be negligible. This has been achieved in three ways: (1) By reducing the weight of all moving parts, (2) by eliminating all mechanical friction, and (3) by so constructing the valve and so catering for the tar deposition from the gas that the one shall not be hindered by the other. A more detailed explanation follows.

(1) Not only are the bell and the valve and other moving parts made as light as practicable, but they are counterbalanced the one against the other so as to eliminate the necessity of counterbalance weights other than are required to vary the controlled pressure or vacuum. Thus the total inertia may be reduced by as much as 90%.

(2) The bell and the valve are guided only by suspension, so that sliding friction may be as far as possible avoided. There is only one (3-point) guide to the vertical centre rod which carries the valve.

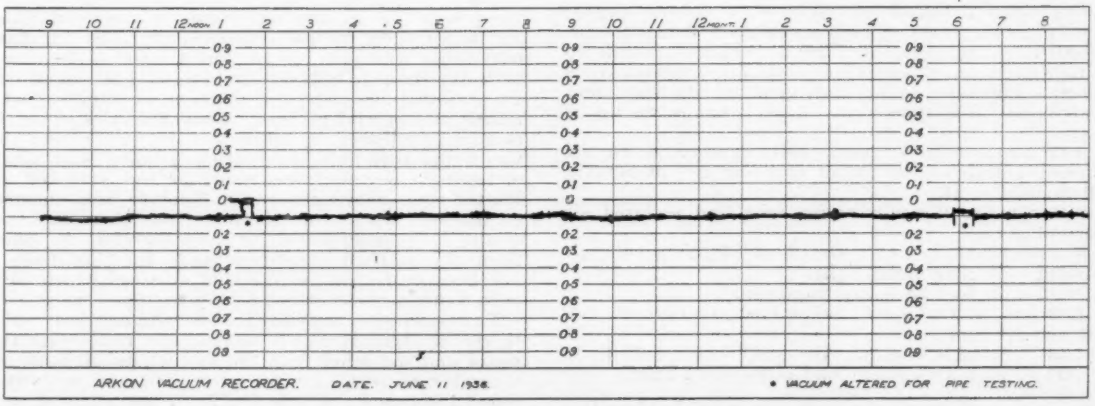
(3) The valve is a plain vertical cylinder of monel metal, closing upward against a cast-iron seating, and having no horizontal or inclined surface upon which tarry deposits can settle. Moreover, the housing and gasways of the governor are so arranged as to encourage the deposition of tar away from the chamber in which the valve operates. One of the axioms recognized in the design is that *every retort house governor is a potential tar extractor*, and provision must be made accordingly.

The lower end of the valve cylinder, or sleeve-valve as we usually call it, is sealed in liquor, and by reason of its design is practically compensated against the influence of changes in the ungoverned pressure.



The control bell, which is annular and works in an oil seal, is suspended at three points from light counterbalance beams with adjustable stainless steel tapes.

It will be noticed from the illustration that the gas passes up the centre pipe and is restricted by the sleeve-valve working in an annular liquor seal chamber and closing upwards; from this restriction it emerges into a large annular expansion chamber where its curved path following the throttling action of the sleeve-valve tends to



Pressure Chart from Inlet of 18 In. B.K. Vacuum Governor.

encourage the precipitation of tar. Thence it flows downwards past a further restriction designed to check the movement toward the outlet and maintain an even peripheral flow from the sleeve-valve so that no lateral pressure may be exerted.

The influence of governed gas pressure under the bell is communicated by an impulse pipe which can be connected if desired at a distance from the governor to any point in the collecting main where control is desired. Thus the governor itself can be fixed either upon the retort bench or upon the charging stage.

There is a liquor circulation pipe and a tar run-off, and also a steam connection provided for scurfing if required.

The whole governor is completely enclosed and dust proof, with removable cover or covers according to size. The smaller cover shown in the illustration is for adjusting weights; these can be placed either upon the bell or upon the centre sleeve accordingly to whether pressure or vacuum is required. Weights may be provided as small as a quarter tenth pressure.

For cleaning the working parts, the bell is removed, the oil drawn off, and then the valve seat can be unscrewed and the sleeve valve drawn out from above.

The B.K. governor can be pressure-loaded if required, for which purpose it is necessary to bolt and joint a plate on the top in place of the loose cover; a flange is provided on the housing. The pressure-loading is effected by a small pilot governor situated at any distance from the main governor and actuated by clean gas, which discharges into the vacuum main.

This governor has been designed in collaboration with the Gas Light and Coke Company, to whose initiative it is due, and by the perseverance of whose staff it has been satisfactorily developed. The manufacture is by Parkinson & Cowan (Gas Meters), Ltd., under patent 395,443, and pat. appl. 20017/35, the latter by licence.

Metal Coating with the Pistol*

By J. FASSBINDER and P. SOULARY

The phenomena brought into play through the action of corrosive media on metal surfaces are usually of a complex character. A more general case—because it applies to all metal constructions commonly in use—arises through the corrosive effect of the atmosphere, especially the polluted air of industrial centres. Hence the interest attaching to an examination of the effectiveness of the protection against atmospheric corrosion afforded by metallizing constructional steel with various metals and alloys. Moreover, the applications of metallization in this field are already known to be both numerous and important, and a multitude of successful results are on record from the observation of members and constructions in actual service protected in this way.

It would appear that up to the present little has been done to study the matter except through this direct experience which, while it clearly has the advantage of leading to conclusions that are quite irrefutable, has the disadvantage of being lengthy. This is especially true where the question is one of deciding in some specific case what form of protection is the most economical, considering the nature of the deposit, method of working, effect of different treatments applied to it, and so forth. It is clear, then, that great value would attach to some technique of accelerated corrosion allowing the different kinds of protective coatings to be rapidly classified according to their quality and economy in the same order that they fall into from direct experience, the correlation having been carefully checked once and for all.

Method of Testing.

Such a method already exists. It has been perfected by the laboratory belonging to the research committee on paints and varnishes at Bellevue (Comité de Recherches et Expériences Techniques des Peintures et Vernis, Office National des Recherches Scientifiques et Industrielles et des Inventions) and was described in 1935 in Nos. 244 and 249 of the monthly Bulletin of that organization.

According to this method, the resistance to corrosion offered by a coating is expressed by the time during which steel specimens so coated are able to withstand, without noticeable effect, the tests imposed by an apparatus for producing rapid artificial corrosion of a definite degree of severity; in the event of such a specimen showing signs of a destructive process the time at which it begins to suffer injuries is noted and their eventual development is described. The tests to be undergone by the specimens are distributed in a time cycle of 24 hours made up as follows:

8.15 a.m. to 8.45 a.m.: Soft shower, in an air current polluted with 2% of H_2S and 2% of SO_2, in ultra-violet light.

8.45 a.m. to 9 a.m.: Saline mist and polluted air current.

9 a.m. to 11.15 a.m.: Dry heat of 55°-60° C., air current and ultra-violet light.

11.15 a.m. to 1.30 p.m.: Stoppage.

1.30 p.m. to 1.45 p.m.: Saline mist, air current, and ultra-violet light.

1.45 p.m. to 3.30 p.m.: Dry cold from − 3° C. to − 10° C. with air current and ultra-violet light.

3.30 p.m. to 4.30 p.m.: Damp heat at over 70° C., with air current and ultra-violet light.

4.30 p.m. to 5 p.m.: Damp heat with air current, ultra-violet light, and sudden chillings by showers of soft water.

5 p.m. to 5.15 p.m.: Daily observation of samples.

5.15 p.m. to 8.15 p.m. next day: Immersion of the samples to the middle of their height in artificial seawater.

It will be seen that by this method the samples are subjected to physical and chemical actions which reproduce, in an intensified degree, the main forms of corrosive attack arising from the atmosphere in industrial centres and at sea. The results so obtained have been compared with those recorded on large numbers of specimens exposed to the weather, with the result that protective coatings can be classified in the following way according to the resistance they offer to accelerated corrosion:

(1) *Very good:* Coatings not affected after 10 to 12 cycles of accelerated corrosion.
(2) *Good:* Coatings not affected after 6 to 8 cycles, the steel so protected showing only very slight signs of attack at the 10th cycle.
(3) *Fairly good:* Coatings which at the 10th cycle show only a few spots of rust in the upper half of the specimen and a few corrosions of limited extent in the lower half.
(4) *Indifferent and bad:* Coatings markedly affected after the 6th and 3rd cycles respectively.

Results.

The coatings submitted to test were of zinc (0·12 mm. thick), cadmium (0·12 mm. thick), aluminium (0·16 mm. thick), Studal (0·16 mm. thick), and Inalium (0·20 mm. thick). On account of their high resistance to corrosion the samples were tested for a period of 27 days during which they underwent the daily cycle described above; after the tests were completed the samples were kept for a further period of three months in a closed room, and their final state was examined at the expiration of this period.

The zinc coatings had been made with the wire pistol or the powder pistol; in a single run or in several runs; with air or nitrogen for projection, either after treatment or not; those which had been doped were so treated either with oxy-chloride followed by two coats of zinc-white paint (as is sometimes done for the sake of appearance) or by means of a special process. After 27 cycles of accelerated corrosion, followed by three months in a closed room, it was found that only the coatings showed superficial signs of injury: they had been more or less attacked and exhibited spots varying in size and colour from one specimen to another. In no case, however, was there any corrosion of the steel underneath. It may therefore be concluded, from the method employed, that these coatings afford *excellent protection*, seeing that coatings which withstand even a dozen cycles may be considered as "*very good.*"

Two specimens metallized with cadmium were submitted to the accelerated corrosion test, one made with the wire pistol and the other with the powder pistol, both made in several runs using air for projection and without subsequent treatment. The first of these specimens showed perfect resistance to 27 cycles of tests and its steel base re-

* From a Paper before the 12th International Congress of Acetylene, Oxy-Acetylene Welding, and Allied Industries.

mained uninjured after three months storage; its layer of cadmium had a reddish yellow appearance caused by superficial sulphurization. The second specimen, however, resisted only 7 cycles; rust appeared from the 8th to the 20th cycle and the test was then interrupted; three months later it was ascertained that this specimen had rusted partially, but deeply. In the case of cadmium, then, much more resistant deposits were produced with the wire pistol than with the powder pistol.

The specimens metallized with aluminium were done from an extra-pure wire of that metal using either air or nitrogen as the projecting gas and making the projection either directly on to the sanded steel or on to an underlayer of zinc (also obtained by metallizing); several runs were applied, with or without subsequent treatment by carbonation, by projecting glass with the pistol, by applying two coats of aluminium paint or by a special treatment. At the end of 27 cycles of the test and three months' storage various injuries and superficial discolorations of the aluminium layer were noticed as in the case of the zinc, but the steel underneath was still untouched. The protection obtained is, therefore, excellent.

A specimen metallized with Studal by means of a wire pistol, over an underlayer of zinc, and brushed before the corrosion tests, resisted 23 cycles of the latter; at that juncture an important attack on the steel was noticed in the neighbourhood of the specimen and the test was stopped. After three months' storage it was found that the upper portion of the specimen which had not been immersed in artificial sea-water was well preserved, but that the coating had peeled off the lower portion and the steel there was badly rusted.

Finally, one specimen had been metallized with Inalium —once again by use of a wire pistol—over an underlayer of zinc without any further treatment. After 27 cycles of tests and three months' storage the layer of Inalium showed some depth of disturbance, but the steel underneath was undamaged.

The inference may be drawn that Studal affords very effective and Inalium excellent protection, justifying the use of these alloys both for protection and decoration in a great number of applications.

The upshot of these accelerated corrosion tests is to confirm, clearly and unmistakably, the results hitherto recorded from direct experience. When it is borne in mind that a paint or varnish which resists 12 cycles of the tests is adjudged " very good " it becomes evident that metallized coatings capable of withstanding a very much greater number of cycles must be extremely effective weapons to use in the conflict against atmospheric corrosion.

Conclusion.

Coatings deposited by the process of metallization have mechanical properties amply sufficient for all uses to which they are now being applied and doubtless for many other applications yet to be conceived. Their adhesion to sanded surfaces of mild steel is such that heavy statical loads may occur in the members so protected without there being any occasion to fear that the coatings will peel off. The degree of homogeneity they possess is rather low, but this in no way impairs their effectiveness in protecting against corrosion; moreover, the homogeneity can be very much improved, in certain cases, by substituting nitrogen for the compressed air which is ordinarily used as the projecting gas.

City and Guilds of London Institute Examinations

The following questions were set in the City and Guilds of London Institute Examinations for 1936 in the subjects named.

MINOR COURSE IN GAS-WORKS PRACTICE.

Tuesday, May 5, 7 to 10 p.m.

(The maximum number of marks obtainable is the same for each question. Not more than six questions to be attempted.)

1. Sketch a " step grate " producer of a type suitable for incorporation in a setting of horizontal retorts.
State, *very briefly*, the nature of the chemical reactions which take place within the producer and within the combustion chamber of the retort setting, when the setting is at work.

2. What is retort carbon, and what causes it to be formed?
Why is it necessary to remove it periodically?
At what positions is it most commonly deposited in continuous vertical retorts, and what precautions should be taken in removing it from such retorts?

3. What purpose is served by the relief holder used in connection with the manufacture of water gas?
At what stage in the process does water gas enter the relief holder?

4. Sketch a modern type of water-cooled condenser, indicating in your sketch the directions of flow of gas and of water.
Given two such condensers, show diagrammatically how the gas mains and valves should be arranged so as to enable the two condensers to be operated either in series or in parallel, or for either condenser to be by-passed while the other remains at work.

5. Explain what is understood by the following expressions:

(*a*) A calorific value of 500 B.Th.U. gross per cu.ft.
(*b*) A pressure of 10 in. water gauge.
(*c*) A superheat of 50° F.
(*d*) A content of 3% volatile matter on the dry basis.

6. Sketch a large cast-iron rack and pinion valve, having flanged inlet and outlet.
Show clearly in your sketch the internal construction of the valve.

7. What types of mechanically driven plant may be used for the separation of coke into several sizes?
Mention, briefly, the chief advantages of each type.

8. Describe, with the aid of sketches, a station meter of the wet drum type.

MINOR COURSE IN GAS SUPPLY PRACTICE.

Tuesday, May 5, 7 to 10 p.m.

(The maximum number of marks obtainable is affixed to each question. Not more than six questions to be attempted.)

1. Sketch a water-loaded station governor. How are fluctuations in the district requirements transmitted to the governor bell? *(30 marks.)*

2. Sketch and describe one system of distance control for domestic lighting. *(30.)*

3. What do you understand by the following terms used in connection with gas meters:

(*a*) Capacity per hour;
(*b*) high capacity? *(20.)*

4. How does the damage done to a gas main by electrolysis differ from that done by electric fusion? *(20.)*

5. State what provision should be made for collecting condensate in a high-pressure distribution system. Would you expect more or less condensate in a low-pressure system for an equal volume of gas? *(30.)*

6. Describe and sketch any type of multi-point water heater with which you are familiar. *(30.)*

7. What are the merits of the clockwork system of lighting and extinguishing street lamps? *(20.)*

8. Sketch, and describe the purpose of, a form of anti-fluctuator used in conjunction with gas engines. *(20.)*

GAS FITTING.

GRADE I.

Monday, May 4, 7 to 10 p.m.

(Not more than six questions to be attempted. The maximum number of marks obtainable is the same for each question.)

1. Sketch a 6-in. " U " pressure gauge, full size, and show the level of water at 3-in. pressure. Describe briefly the uses to which such a gauge can be put in gas fitting work.

2. A hot water cylinder has internal dimensions of 18 in. diameter and height 3 ft. How many gallons of water will this cylinder hold and what will be the weight of the water?

3. Illustrate, with the aid of a sketch, how you would fix the shelf to support a meter of 5-light size to a brick wall, and give

a list of the materials and tools required for the complete fixing of the shelf and of the meter to existing service and outlet pipes. (Assume the service and outlet pipes to be within 18 in. of the meter position.)

4. What solders and fluxes are you familiar with and for what jobs would you use each of them? Why is the flux necessary in each case?

5. Sketch any incandescent burner with which you are familiar, name the various parts, and detail the uses of each.

6. Assume that you have fitted a cooking stove; describe fully how you would regulate and test the burners for the best results.

7. What is the difference between a volumetric and a pressure governor? In what circumstances is each used?

8. How many hours of use per therm would you expect to get from the following appliances: (*a*) 8-gallon wash copper, (*b*) 10-in. (7 radiants) gas fire, (*c*) 5-light cluster low-pressure lamp?

9. Explain the difference between seamed and solid drawn brass tubing. Which is to be preferred for making gas brackets and pendants, and why?

GAS FITTING.

GRADE II.—WRITTEN PAPER.

Monday, May 4, 7 to 10 p.m.

(*Not more than six questions to be attempted. The maximum number of marks obtainable is the same for each question.*)

1. What is the difference between a luminous flame and a bunsen flame? Why is the former used in instantaneous water heaters and the latter on the hotplates of cooking stoves?

2. Describe fully any modern gas switch for lighting burner or gas fire.

3. How many cubic feet of 500 B.Th.U. gas would be required to raise the temperature of 8 gallons of water in a wash copper from 60° to 200° F., assuming the efficiency to be 50%?

4. Give a sketch of a large meter with flange connections, showing how you would connect it and provide a by-pass. Name the size of meter you deal with and give the sizes of all the connections.

5. Give simple sketches of (*a*) a complete coke heated cylinder system supplying hot water for a bath, hand basin, and kitchen sink, and (*b*) the same system after the coke boiler had been removed and a gas storage water heater fitted in its place.

6. A consumer complains of a bad supply of gas to a cooking stove. Upon investigation it is found that a partial stoppage exists between the meter inlet and the appliance. State step by step how you would find the position of the obstruction and remedy the trouble.

7. Explain in detail the work involved in fixing a single point instantaneous water heater to adjacent gas and water supplies. Give an outline sketch of the flue equipment, and state the name and purpose of each part. What tests would you apply on completion?

8. Detail how you would carry out the following jobs and give a list of the tools required in each case: (*a*) To cut a hole in a hot water tank to take a 1-in. pipe, (*b*) to fix a lighting bracket on a lath and plaster wall, (*c*) to take up a wood tongued floor board.

9. The oven of a gas cooker is said to "smother." What do you understand by this, to what may the trouble be due, and what steps would you take to remedy it?

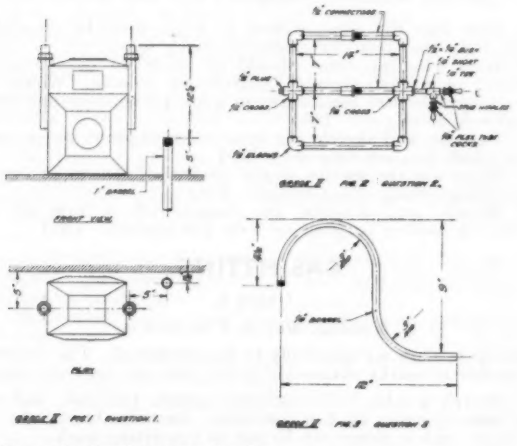
GAS FITTING.

GRADE II.—PRACTICAL EXAMINATION.

(*Four hours allowed for this paper. Candidates must attempt all questions.*)

The following materials to be supplied to each candidate:

One 2-ft. 9-in. length of 1-in. lead pipe (gas weight).
One 10-light meter cap and lining.



One 1-in. lead to barrel union.
Three 2-ft. lengths of ½-in. wrought iron or mild steel barrel (tubing).
Four ½-in. elbows.
Two ½-in. equal crosses.
Two ½-in. connectors or long screws, 8-in. or longer.
One ½-in. plug.
One ½-in. by ¼-in. bush (iron).
One ½-in. short piece.
Two ¼-in. stub or barrel nipples.
One ¼-in. equal tee piece.
Two ¼-in. teat or flexible tube cocks.
One 3-ft. length of ¼-in. wrought iron or mild steel barrel (tubing).

1. With the material provided, make the 1-in. diameter outlet meter connection to the dimensions given in fig. 1. Springs and bobbins are not to be used. (*Time allowed, 1½ hours: 35 marks.*)

2. With the material provided, make the barrel fitting to the shape and dimensions shown in fig. 2. On completion test the job for soundness at 3-in. water gauge pressure. (*Time allowed, 1½ hours: 35 marks.*)

3. Bend the 2-ft. length of ¼-in. barrel provided to the shape shown in fig. 3. (*Time allowed, ¾ hour: 20 marks.*)

4. Regulate the 3-light lamp (without mantles). State the hourly gas rate, and the approximate candle power. (*Time allowed, ¼ hour: 10 marks.*)

GAS FITTING.

FINAL.—WRITTEN PAPER.

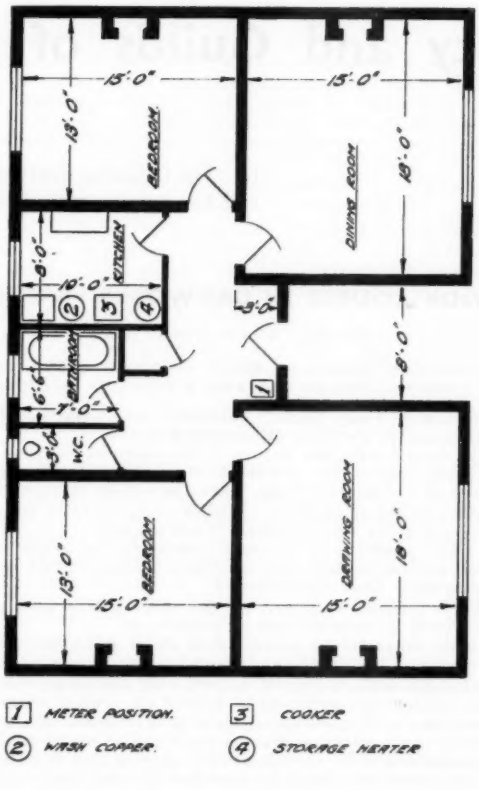
Monday, May 4, 7 to 10 p.m.

(*Not more than six questions to be attempted. The maximum number of marks obtainable is the same for each question.*)

1. If you are called to an escape and upon arrival find a strong smell of gas in all the ground floor rooms of a house, how would you proceed? If upon investigation you find that the house pipes are sound and the gas is entering from the footway, what action would you take?

2. How would you deal with trouble in service pipes due to (*a*) rust, (*b*) water, (*c*) naphthalene?

3. What do you understand by "testing a meter *in situ*?" In what circumstances would this be done, and how would it be carried out with a meter of 200-light size?



FINAL GRADE. FIG. 1. QUESTION 8.

4. Show by means of a line diagram a complete gas hot water circulating system supplying a bath, hand basin, sink and towel rail. Give the sizes of pipes, the capacity of the storage cylinder and the hourly gas rate of the water heater you would recommend.

5. You are sent to attend to the following:—(*a*) the burners of the hotplate of a cooking stove, which give off a smell when alight, and (*b*) a gas fire which lights back. State the probable cause and remedy in each case.

6. A hall is centrally heated from a gas fired water heater and you are instructed to fix a thermostat which operates by the air temperature in the hall. What type of thermostat would be used for such a purpose? Explain (*a*) how and where it would be fitted and (*b*) how you would adjust and test it.

7. Assume it is necessary to lay a high pressure service pipe

to a building where low pressure gas will be used. Give an outline sketch of the type of governor used in such circumstances, showing how it would be fitted and explaining the method you would adopt to ensure that the high pressure gas did not enter the meter and carcass in the event of a split or punctured diaphragm.

8. Fig. 1 shows the plan of a modern flat which is to be carcassed completely for the following gas appliances:

Kitchen: 20-gallon low consumption storage water heater.
Medium size cooker.
8-gallon wash copper.
Dining room: Gas fire.
Drawing room: Gas fire.
Two bedrooms: Gas fires.

Indicate on fig. 1 the proposed run for the gas supply pipes. In addition give a list of the material required for the job, and state (*a*) the size of meter which you would use and (*b*) the time you would expect to take on such an installation with the help of a capable assistant.

9. When carrying out the maintenance of—(*a*) cookers, (*b*) wash coppers, (*c*) fires, (*d*) radiators, what are the common troubles experienced and how would you deal with them?

GAS FITTING.

FINAL.—PRACTICAL EXAMINATION.

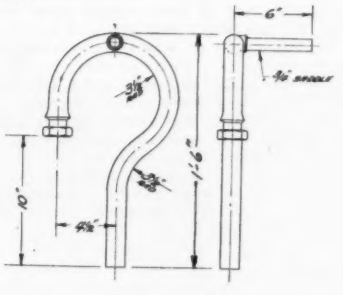
(*Four hours allowed for this paper. Candidates must attempt all questions.*)

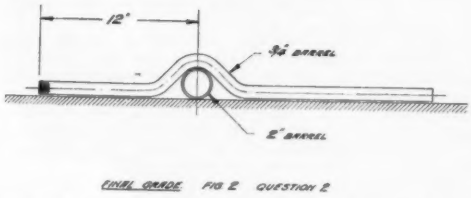
The following materials to be supplied to each candidate:

One 5-ft. length of ¾-in. wrought iron or mild steel tubing.
One 3-ft. length of 1¼-in. lead pipe (gas weight).
6 in. of ¾-in. lead pipe.
One 1¼-in. brass union (lead to barrel).
One 20-light meter cap and lining.
One 3-ft. length of well-annealed, polished, solid-drawn brass or copper tube (18 gauge or as used by the local gas undertaking).

1. Make up the 1¼-in. lead meter connection to the shape and dimensions shown in fig. 1, and make a saddle joint as indicated. Springs or bobbins may be used. (*Time allowed, 1½ hours: 35 marks.*)

2. With the aid of the forge, set the length of ¾-in. barrel to the shape and dimensions given in fig. 2. (*Time allowed, 1¼ hours: 30 marks.*)





3. With the material provided, set the brass tube over the section of wood curb, connect the gas fire and regulate the burner for the best results. (*Time allowed, 1 hour: 25 marks.*)

4. Examine the back pressure valve handed to you by the examiner. Explain how it operates and in what circumstances it is used. (*Time allowed, ¼ hour: 10 marks.*)

The Measurement of Gas by Therms

Enquiry by Joint Parliamentary Committee

Arising out of the South Metropolitan Gas Company's Bill now before Parliament an enquiry was opened on June 30 before a Joint Committee representative of both Houses of Parliament "to consider whether it is expedient, and if so in what circumstances and subject to what conditions, to authorize the measurement of gas supplied by gas undertakers to consumers by means of meters so designed as to register in therms instead of in cubic feet."

The Committee consisted of Lord Rennell (Chairman), Lord Fairfax of Cameron, Lord Carnock, Lord Kennet, Major C. F. Entwistle, K.C., Mr. T. C. Ede, Mr. J. S. Holmes, and Mr. Arthur Reed.

Mr. Tyldesley Jones, K.C., Mr. F. J. Wrottesley, K.C., and the Hon. Harry Hope appeared for the South Metropolitan Gas Company; Mr. Sydney Turner, K.C., and Mr. Alfred Tylor represented the Board of Trade; and Mr. H. Royston Askew appeared for the National Gas Council.

Mr. WROTTESLEY said the South Metropolitan Gas Company had promoted a Bill which was in the ordinary course referred to a Committee of the House of Lords. By far the most important provision in the Bill was one which enabled the Company hereinafter to supply their gas by meter which would register not as now in cubic feet, but in therms, and would record in volume the heat units. After an investigation by a House of Lords Committee which was presided over by Lord Cozens-Hardy—after "two days' patient hearing" as one member himself described it—the Committee passed the Bill unanimously. In the ordinary course that would mean that the Bill would proceed through Parliament, but the Board of Trade was apparently not convinced, and intimated they were not prepared to accept the decision of the Committee and would move to delete the very provisions as to which the enquiry was held. Dr. Burgin, however, who was seen on the subject, said the Board would be good enough to consider the holding of an enquiry into the whole question of therm meters with a view to seeing how far it was desirable to have them introduced all over the country. To that course the Company agreed, it being understood that if the view of the present Joint Committee was favourable the Bill was thenceforth to proceed unopposed through Parliament. It was the Company's Bill, therefore, that was at stake.

Models showing how the new kind of meter proposed to be introduced to register the number of therms could be read were handed in by Mr. Wrottesley for the inspection of the members of the Committee and by Counsel. The fact, said Mr. Wrottesley, that the gas would continue to be measured by volume, was a thing which troubled the Standards Department of the Board of Trade, but when he rode in a taxi he never had the feeling that he was being misled or deceived or ill-treated because the meter registered the number of miles while the index showed him the amount of money due.

In reply to the Chairman, Mr. Wrottesley said the Company would pay for the new meters. There were about 444,000 to deal with, but the outlay would not add very much, if anything, to the cost. It depended a good deal whether the meters were introduced in the course of the periodic overhaul of meters.

Asked by the CHAIRMAN if the consumer could have both kinds, Mr. WROTTESLEY replied in the negative.

The CHAIRMAN: If he had both and was mathematically inclined he could make his own calculation and verify it by the other meter.

Registration and Calorific Value.

Mr. WROTTESLEY went on to say that one of the main objections of the Board of Trade was that the new index was only correct for gas of a particular calorific value—560 B.Th.U.—and that if the number were 500 the meter would not be correct, and alterations would have to be made. The complaint was that different indices would be required in different areas. That was true. Another suggestion was that the calorific value might be changed. It was changed fourteen years ago, and if it were changed again provision would be made for the change.

COUNSEL proceeded to deal with the report by the Board of Trade on the Bill, and referring to the Board's suggestion that "it is undesirable to substitute for the cubic foot, which can be directly measured, a unit—namely, the therm—which cannot be so measured and is regarded by the general Act merely as a basis of charge," said if the purpose of the meters was to bring comfort to the gentlemen in charge of the Standards Department of the Board of Trade, he could understand the criticism, but the proposal was to help and to protect the consumer.

On the subject of the supplying of the required calorific value, Mr. WROTTESLEY said he believed that never in the history of the Company had they failed to supply the required value. It was a matter on which the Company concentrated very closely, and he understood that they had never had an accident. Concluding his opening speech, Counsel said public utility undertakings could only really progress and prosper if they had a thoroughly good understanding with the people they supplied. That was essential. The whole object of the proposal was to make the system under which they charged a little simpler.

Dr. *Charles Carpenter*, President of the South Metropolitan Gas Company and Chairman of the Board of Directors, examined by the Hon. Harry Hope, said he had been associated for over 55 years with the manufacture and supply of gas in the Metropolis. He was also Chairman of the Commercial Gas Company and the South Suburban Gas Company. The main

policy of the Companies with which he was associated was to sell gas as cheaply as possible and to live on the best possible terms with the gas consumers. He endorsed the statement of the Committee following the appointment of the Fuel Research Board that the interests of the consumers could best be served if the sale and purchase of heat energy were measured in heat units, so that the consumer was charged for the thermal units received in the same way as was the electricity consumer. His general idea on the subject arose as early as the spring of 1914, but he thought no more about it until the difficulties which arose during and immediately after the war. Dr. Carpenter spoke of the efforts of the Company to make the public "thermal minded," and said in reference to electrical competition they wanted in every way to keep themselves in the best possible light with consumers and not let them be under an impression that they were paying a charge which might be correct and might not. The thermal system of charging had become firmly established now.

In reply to Mr. SYDNEY TURNER, who asked whether in his view the processes of carbonization had reached finality, Dr. *Carpenter* said there was no process on the horizon that could be regarded as a change from the methods now generally adopted. So far as he could foresee no change was likely to take place in the near future with regard to the calorific value of the Company's gas.

Mr. ARTHUR REED: You are spending a lot of money and going to a tremendous lot of trouble for the benefit of consumers. Are you not getting any benefit yourselves, and if so, what?

Dr. *Carpenter*: No monetary benefit whatever, not a farthing, but we do hope to put ourselves in a better position to deal with our competitors. We loosen one of our hands, both of which are at present tied behind us.

Sir *Charles Boys*, a Gas Referee, who said he attended under the Speaker's orders, stated that the request of the South Metropolitan Gas Company was to enable them to put wheels into a meter which would do the work of a multiplication and division sum automatically. He emphasized that the advantage of such a meter was that in the place of the Company going round and reading 400,000 meters and doing 400,000 multiplication sums, which gave opportunities of mistake, the wheels would do that for them with no possibility of a mistake. He had invented many scientific instruments, and the proposal now made was the obvious thing to do. The objection was raised that this would not do at all: the meter was going to tell the consumer, or the Company's employee, that so many therms had been consumed when the instrument obviously measured only the quantity of gas in cubic feet, but the heating value of the gas received depended on two factors, the quantity and the quality. The accuracy with which the Company maintained their supply of gas was on the average eight or ten times as great as that of the domestic meters passed by the Board of Trade. As to the question of probable fraud, he looked on the suggestion of a conspiracy between the consumer and an official of the Company to put in a meter with a wrong index number as something which could be regarded only as "moonshine." (Laughter.)

Major ENTWISTLE asked the witness whether there were any objections to the alteration of the meter.

Witness: No. It is exactly what I should do if I had a free hand.

Mr. REED: Is there any advantage to the Company to the detriment of the consumer?

Witness: I know of none.

Major ENTWISTLE: Would they get any financial advantage at the expense of the consumer?

Witness: None whatever.

Mr. *Francis Charles Raphael*, speaking with a long experience of the electrical industry, said the proposed therm meter bore a very considerable resemblance to the electrical meter, and its use would lead neither to fraud nor to any difficulties.

Mr. *John Terrace*, Chairman of the Meters Committee of The Institution of Gas Engineers, said he did not think it was possible for a wrong meter to be sent out, though he agreed that it would be a safeguard if meters were coloured differently according to the different declared calorific values.

Accuracy of Therm Meter Assured.

Mr. *Ernest W. Smith*, a manufacturer of meters, stated that he had examined the South Metropolitan Gas Company's proposed therm meter, and had no hesitation in saying that it could be examined by the authorities and its accuracy assured equally well as the present cubic foot meter.

Mr. *Francis George Brewer*, Secretary to the South Metropolitan Gas Company, said the Company had devoted great attention to the design and construction of gas meters, and possessed their own meter shops, which turned out 50,000 meters, both new and repaired ones, every year. In 1935 the number of new meters was 17,636 and repaired meters 31,017, at a cost of £50,316 and £38,725 respectively. With regard to the cost of putting in new indices, the repaired meters would cost 1s. 6d. each, while an entirely new meter would cost 15s. The Company's total revenue was £3,351,000, so that the cost would be very small in relation to that total. The Company had 134,223 ordinary meters and 332,109 prepayment meters. The area of supply was 52 square miles of South London, comprising a population which was estimated at 1,500,000. Only 1,212 meters were privately owned, and of these 144 were in private houses and the rest in various public buildings, the Southern Railway Company having 172 and the London County Council 492 in the schools and 120 in their dwellings.

The Hon. HARRY HOPE, for the South Metropolitan Gas Com-

STANTON
"NEW" SPUN IRON PIPE
Manufactured under Delavaud and Mairy Patents

No Chill
No Annealing
No Hard Spots

The Stanton Ironworks Company Limited, Near Nottingham

pany, said the question had been raised that it would be possible for an officer of the Company, or of any gas company which had the therm meter, to arrange fraudulently for a wrong meter to be put in. Did the witness consider that such a fraud was possible?

Witness said he really could not see that it was within the bounds of possibility.

Cross-examined by Mr. Sydney Turner, K.C., for the Board of Trade, *Witness* stated with regard to the growth of the Company that last year the increase in the number of consumers was 2,300. It would take about nine years to deal with the whole of the meters, assuming that they were dealt with in rotation.

The Hon. HARRY HOPE stated that that closed the case for the Company.

Mr. ROYSTON ASKEW, for the National Gas Council of Great Britain and Ireland, addressing the Committee, said the Council were representative of the suppliers of 90% of the total gas publicly supplied throughout the country to-day. The Council, through its Central Executive Board, had had to consider questions relating to the possible use of therm meters on previous occasions: (1) In April, 1935, when the Bill promoted by the South Metropolitan Gas Company was before Parliament; (2) early this year, when the second Bill of that Company was in Parliament; and (3) recently, when the terms of reference to the present Joint Committee were publicly announced. On each occasion the Council had expressed the view that, while it was opposed to the imposition of any obligation on gas undertakers generally to provide or use therm meters, it was in favour of any gas undertaking which desired to do so and sought suitable powers being granted such powers.

It had always been the policy of the National Gas Council—one might say of the Gas Industry—to encourage consumers to read their meters as much as possible, because it tended to prevent waste, and the wasteful users of gas were as much against the interests of the Gas Industry as against their own, for the reason that it gave them the idea that gas was an expensive commodity. The National Gas Council were not able to give any particular evidence of the demand of the public for meters of the type proposed, but they felt that the experiment was one which might be usefully and profitably applied. All discussions as to objections at the present stage must be purely theoretical, and everyone would be in a better position to judge after the matter had been tried out on a practical scale. Any general change over throughout the country would raise rather big questions. There were to-day more than 10,000,000 gas meters in use in domestic premises alone, leaving out the very large number used in industry and public buildings and elsewhere, and the conversion of those to new forms would not only take a very considerable time, but would involve a heavy expense, and the Gas Council suggested that it would not be in the public interest to embark on any general change over at the present time.

Mr. *Edward J. Fottrell*, Joint Manager of the National Gas Council, bore out Counsel's statement. He added that the proposal was an interesting experiment which ought to be confined for the time being to the South Metropolitan Company's area.

In reply to Mr. Tyldesley Jones, K.C., for the South Metropolitan Gas Company, *Witness* stated that the South Metropolitan Company were not members of the National Gas Council.

Mr. TYLDESLEY JONES: You are therefore looking at the matter quite independently?

Witness stated that the Company were the only exception to membership of any size.

Mr. SYDNEY TURNER, in an address on behalf of the Board of Trade said that the Board of Trade, rightly or wrongly, on a meter of the present type being submitted to them a few years ago came to the conclusion in the exercise of their discretion that such a meter in the hands of a person who desired to be dishonest would make his task easier and so would not give their certificate.

One objection which the Board of Trade took to the proposed type of meter was that if there were a number of meters registering varying calorific values it would no longer be possible, as it was now, to say that all gas meters throughout the country were interchangeable. Where undertakings changed the calorific value until a corresponding adjustment was made in the meters, all the meters in the area of that company became inaccurate and registered inaccurately.

Mr. Turner maintained that there was no evidence of any general demand for the change from one type of meter to the other.

Mr. Turner added that the Board of Trade submitted that if the change were brought into operation that there should be a penalty imposed for the use of a meter which was used for measuring for some calorific value other than that for which it was designed. Further, if the change was to be made it was submitted there must be some national system of inspection so that there was no district left in which an inspector could not go to see that meters had not a particular calorific value. They also asked that when there was a change in the declared calorific value that there should be an obligation to notify consumers forthwith as to the incorrectness and the proportionate adjustment in charge; and further that there should be a time limit imposed within which all the meters must be changed. Finally, the Board of Trade asked that if the change was to be made they should not be required to certify a pattern at all under Section 6 of the Act of 1904, a pattern which, rightly or wrongly, in the exercise of their discretion, they thought they should not approve. He submitted it was undesirable that a change should be made at all and that if the contrary view were taken by the Committee, the change should be made with the conditions he had mentioned attached.

OPTIONAL
PREPAYMENT METER

OUTSIDE VALVE BOX

EVERY PART INTERCHANGEABLE

MADE BY

THE PIONEERS
OF THE SLOT METER

SAWER & PURVES
(BRANCH OF METERS LIMITED)

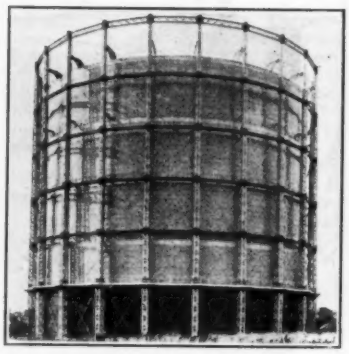
RADFORD ROAD
NOTTINGHAM

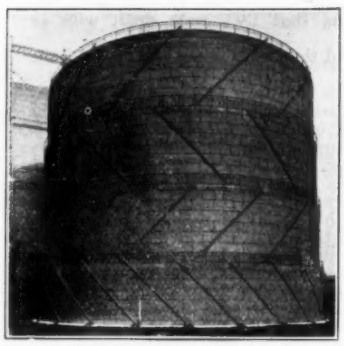
DERBY ROAD
WATFORD

MILES PLATTING
MANCHESTER, 10

SAML. CUTLER & SONS LTD.

GASHOLDERS
GUIDE FRAMED
SPIRAL
WATERLESS
(KLONNE)
STEEL TANKS





PURIFIERS
CONDENSERS
COAL AND COKE
HANDLING PLANT
SCRUBBERS AND
WASHERS

39, VICTORIA STREET
WESTMINSTER
LONDON, S.W. 1

Telegrams: "RETORTUS
SOWEST, LONDON"

Telephone: VICTORIA 8492, 0321

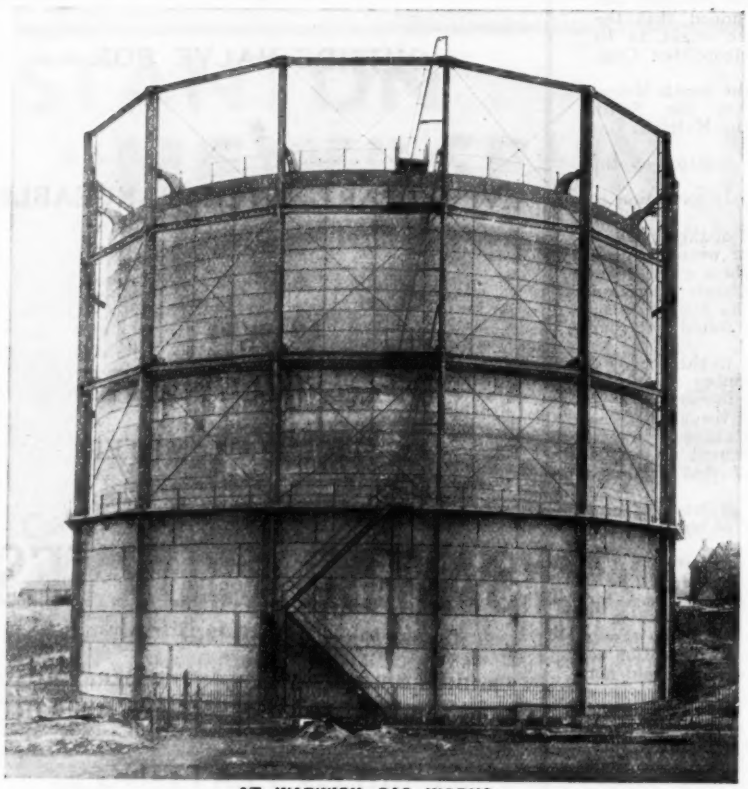
CONTRACTORS FOR
ALL KINDS OF
GASWORKS PLANT
AND APPARATUS

PROVIDENCE
IRONWORKS
Millwall, LONDON, E. 14

Telegrams: "CUTLER
MILLWALL, LONDON"

Telephone: - - EAST 1734-1735

429



AT WARWICK GAS WORKS.

WALKER
R. S. J.
GUIDE FRAMING
IS
ECONOMICAL
IN
CONSTRUCTION
AND IN
MAINTENANCE

C. & W. WALKER,
LTD.,
DONNINGTON,
Nr. WELLINGTON — SHROPS.

'Phone: Lilleshall-Shropshire Nos. 34 & 35 (2 lines)
'Grams: "Fortress," Donnington, Shropshire

London Office - - - 70, VICTORIA STREET, WESTMINSTER, S.W. 1.

'Phone: Victoria No. 1941

'Grams: "Fortress," Sowest, London

Gas Markets and Manufactures

Stock Market Report

(For Stock and Share Lists, see later pages)

Markets were again active last week and the general tone remained firm. The inevitable end-Account profit-taking took place which for a time left its mark on prices, but buyers quickly absorbed the available supplies, so that on balance the majority of quotations closed with little change either way. Mr. Chamberlain's statement relative to a Budget deficit, coupled with the somewhat unsatisfactory first quarter's revenue figures, brought about a temporary set-back in British Funds, but the reactions were subsequently overcome, and prices finished at about the same levels as a week ago. The disappointing traffic returns eased up the recovery in home rails, and though the market is inclined to harden, business will no doubt relax until after the publication of the half-year's statements. The industrial section again provided most of the features, while rubbers and oils were also in good demand.

Gas stocks and shares were well supported, business being spread over a large number of securities, while the prices of recorded transactions were in nearly all cases practically identical with those of last week. Quotations, therefore, with very few exceptions closed unchanged. The largest increase was that of Hartlepool consolidated which rose 3 points to 121 on the Newcastle Exchange, and the next best was in the London List where Southampton 5% maximum stock moved up 2 to 117½. Imperial Continental lost the 2 points gained the previous week, otherwise changes were negligible.

Attention is drawn to the comparatively low price at which Northampton and Portsmouth 5% maximum stocks are now quoted—viz., 110-115. The last transaction in both stocks was at 110, recorded only a few weeks ago, while the yield at the middle market price works out at £4 8s. 10d.%. As the contingency for any reduction in the maximum rate is very remote, a holding of both or either stocks should prove a profitable permanent investment. Watford and St. Albans ordinary is another stock which appears somewhat undervalued at the present time, the yield on the middle market price of 157½, on a 7% dividend, being also £4 8s. 10d.%. The ordinary dividend is subject to sliding-scale and of latter years has been as follows: 1923 to 1929, 6½%; 1930 to 1934, 6¾%; and for 1935, 7%. The Company's progressive policy is evidenced by the fact that during the past twelve years the sales of gas have increased nearly fourfold.

Current Sales of Gas Products

The London Market for Tar Products.

LONDON, *July* 6.

Prices of tar products remain steady at about the following levels:

Pitch is nominal at about 36s. to 37s. per ton.

Creosote is fairly firm at about 5½d. per gallon.

Refined tar, 3¾d.

Pure toluole, about 2s. 4d.; pure benzole, 1s. 7d. to 1s. 8d.; 95/160 solvent naphtha, about 1s. 7d.; and 90/160 pyridine, about 4s. 3d. to 4s. 6d.—all per gallon naked at makers' works.

Tar Products in the Provinces.

July 6.

The average prices of gas-works products during the week were: Gas-works tar, 20s. to 25s. Pitch—East Coast, 34s. to 36s. 6d. f.o.b. West Coast—Manchester, Liverpool, Clyde, 34s. to 36s. 6d.* Toluole, naked, North, 1s. 11d. to 2s. Coal-tar crude naphtha, in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 1s. 4d. to 1s. 4½d. Heavy naphtha, North, 1s. 1½d. to 1s. 2½d. Creosote, *ex* works, in bulk, North, liquid and salty, 4¾d. to 5d.; low gravity, 4½d. to 4¾d. Heavy oils, in bulk, North, 5d. to 5½d. Carbolic acid 60's, 2s. 4d. to 2s. 6d. Naphthalene, £21 to £23. Salts, 95s. to 100s., bags included. Anthracene "A" quality, 3d. to 3½d. per minimum 40%, purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *July* 4.

Pitch, refined tar, and, to a lesser extent, creosote oil remain rather difficult but other products are firm and, in many cases, supplies are not to be secured for prompt and forward delivery.

Crude gas-works tar.—The actual value is 34s. to 35s. per ton *ex* works in bulk.

Pitch.—A few enquiries are in circulation for delivery over the coming season and quotations are round 32s. 6d. to 35s. per ton f.o.b. Glasgow for export, and about 32s. 6d. per ton *ex* works in bulk for home trade.

Refined tar.—This is a disappointing market but prices are maintained at 3d. to 3¼d. per gallon f.o.r. for export, and 3¾d. to 4d. per gallon *ex* works in buyers' packages for home trade.

Creosote oil.—There is a slight easing in tone and the following may be taken as current market values: B.E.S.A. Specification, 5d. to 5¼d. per gallon; low gravity, 5d. to 5½d. per gallon; neutral oil, 4¾d. to 5d. per gallon; all *ex* works in bulk.

Cresylic acid.—Prompt and forward supplies are not easily secured and prices are therefore nominal as follows: Pale, 97/99%, 2s. 1d. to 2s. 4d. per gallon; dark, 97/99%, 1s. 11d. to 2s. 1d. per gallon; pale, 99/100%, 2s. 6d. to 2s. 10d. per gallon; all *ex* works in buyers' packages.

Crude naphtha.—Available supplies of this product now command an increase in price at 5½d. to 6d. per gallon *ex* works in bulk, according to quality and district.

Solvent naphtha.—A fair volume of business has taken place at 1s. 5½d. to 1s. 6½d. per gallon for 90/160 quality and 1s. 1d. to 1s. 2d. per gallon for 90/190 heavy quality.

Motor benzole is commanding 1s. 3½d. to 1s. 4d. per gallon.

Pyridines.—90/160 grade is 5s. to 5s. 6d. per gallon, and 90/140 grade is 5s. 6d. to 6s. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole	0	8¼	to	0	9	per gallon at works
Motor "	1	2	"	1	2½	" " "
90% "	1	3	"	1	3½	" " "
Pure "	1	7	"	1	7½	" " "

Trade Notes

Collin Coke Dry-Cooling Plant.

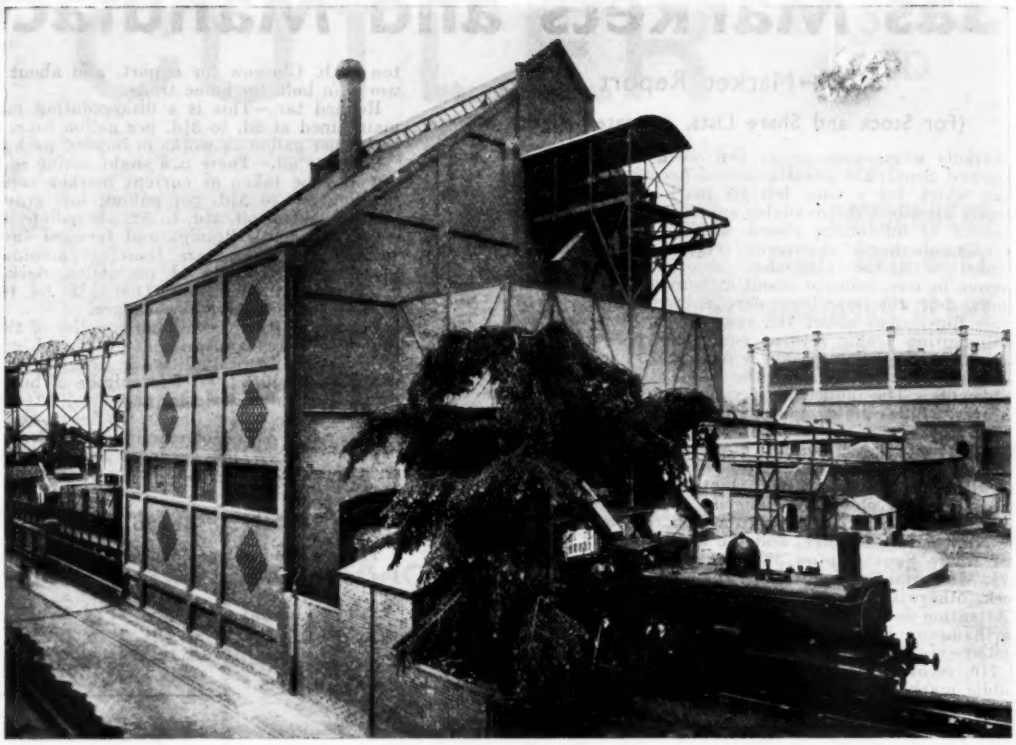
We have received from Gas Chambers and Coke Ovens, Ltd., Artillery House, Westminster, S.W. 1, a copy of their recently issued publication dealing with Collin coke dry-cooling plant. The Firm have the exclusive British licence for the Collin Coke Ovens, which, they state, although not yet widely known in this country, are achieving the highest possible efficiencies. In this country the Firm have made a start by installing an extension to their coke oven plant for the Yorkshire Coking and Chemical Company at Glasshoughton, and a battery of fifteen ovens for the Lambton Hetton and Joicey Collieries, Ltd., Durham. These two have been in operation for some months and are giving full satisfaction, while at Lambton a second battery is nearing completion. In the new publication the Collin coke-cooling plant at the Pretoria Works of the South African Iron and Steel Industrial Corporation, Ltd., is described.

Further Gas Undertakings' Result

Manchester.

The report of the Manchester Gas Committee for the year ended March 31, 1936, states that the quantity of gas sold was 6,417,456,000 cu.ft., a decrease of 0·50% compared with the previous year. The demolition of property in the various clearance areas accounts for a net reduction of approximately 25 million cu.ft. The income from coke has increased by £9,261 when compared with last year. This is accounted for by an increased quantity available for sale as well as an increased selling price. The income from tar shows an increase of £3,196 and is consequent upon a slight increase in price and to an increased yield of tar per ton of coal carbonized. The operations in connection with the recovery of benzole and solvent naphtha continue to be satisfactory and the income from this source shows an increase of £2,002 compared with the previous year, principally due to increased production. After meeting all outlay under renewals account there is a balance to the credit of the account of £291,546. The amount transferred from revenue account was £101,744, which, together with the interest on the fund amounting to £8,885, gave a total credit for the year of £110,629. The amount expended during the year was £115,249. Additional loan capital has been raised to the extent of £26,000 for distribution apparatus. The total capital outlay at March 31, 1936, was £6,278,705, the loan debt in respect of which was £1,662,957, or 26%. After considerable deliberation and with a view to stimulating and maintaining the demand for gas an optional two-part tariff method of charging for gas supplied was adopted and came into operation as from September last. The number of consumers who have taken advantage of this alternative scale is 6,918 and the normal annual consumption affected, 1,290,658,000 cu.ft. Owing to the short period which has elapsed since its inauguration it is too early to gauge the ultimate effect of the revised tariff. The quantity of gas consumed for industrial and commercial purposes during the year was 1,422,986,800 cu.ft., or 22·17% of the total sales.

REPEAT ORDER



Glover-West verticals at the works of the Worcester New Gas Light Company. An order for a second installation is now receiving attention.

The total of Glover-West vertical retort installations built or under construction throughout the world has now reached 395.

Plants are at present in course of erection in six countries.

THE WEST SYSTEMS

Glover-West Vertical Retorts • Westvertical Carbonizing Chambers • West Coal and Coke-handling Systems

DESIGN, MANUFACTURE AND ERECTION BY

WEST'S GAS IMPROVEMENT COMPANY, LTD.

MANCHESTER: ALBION IRONWORKS, MILES PLATTING — 'Phone: COLLYHURST 2961 : 'Grams: "STOKER, MANCHESTER"

LONDON: COLUMBIA HOUSE, ALDWYCH, W.C. 2 — 'Phone: HOLBORN 4108 : 'Grams: "WESGASCO, ESTRAND, LONDON"

STOCK AND SHARE LIST

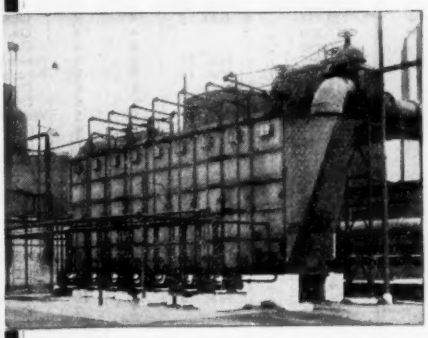
Official Quotations on the London Stock Exchange

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations July 3.	Rise or Fall on Week	Transactions, Lowest and Highest Prices During the Week.
1,767,439	Stk.	Mar. 16	7	7⅛	Alliance & Dublin Ord. ...	155—165	...	163½
374,000	,,	June 22	4	4	Do. 4 p.c. Deb. ...	94—99*	...	...
557,655	,,	Feb. 17	7	7	Barnet Ord. 7 p.c.	169—174	+1	...
300,000	1	Mar. 30	1/4½	1/9⅜	Bombay, Ltd.	1½—1⅝	...	...
179,305	Stk.	Mar. 2	9½	9½	Bournemouth sliding scale ...	220—230	...	...
590,407	,,	,,	7	7	Do. 7 p.c. max. ...	170—175	...	173—175
493.960	,,	,,	6	6	Do. 6 p.c. Pref. ...	148—153	...	150—150½
50.000	,,	June 22	3	3	Do. 3 p.c. Deb. ...	84—89*	...	...
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	105—110*	...	107½—108½
335.000	,,	,,	5	5	Do. 5 p.c. Deb. ...	123—128*	...	...
357,900	,,	Feb. 17	7½	7½	Brighton, &c., 6 p.c. Con. ...	170—175	...	173
649,955	,,	,,	6⅔	6⅔	Do. 5 p.c. Con. ...	155—160	...	158—159
205.500	,,	,,	6	6	Do. 6 p.c. 'B' Pref.	144—149	...	147⅔
855.000	,,	Mar. 2	7	8	British Ord.	158—163	...	160½—162
100.000	,,	June 8	7	7	Do. 7 p.c. Pref.	151—156	...	...
350.000	,,	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	108—113	...	...
120.000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...	...
450 000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	105—110	...	...
200,000	,,	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	97—99	...	...
100.000	10	22 May '33	6	4	Cape Town, Ltd.	1—3	...	...
100.000	10	6 Nov. '33	4½	4½	Do. 4½ p.c. Pref. ...	1—3	...	...
150.000	Stk.	June 22	4½	4½	Do. 4½ p.c. Deb. ...	80—85*	...	...
626.860	,,	Feb. 3	6	6	Cardiff Con. Ord.	130—135	...	130½
237.840	,,	June 8	5	5	Do. 5 p.c. Red. Deb.	108—113	...	...
98.936	1	Apl. 20	2/-	2/-	Colombo, Ltd., Ord.... ...	1⅜—1⅞	...	...
24.500	1	,,	1/4½	1/4½	Do. 7 p.c. Pref. ...	20/—22/-	...	...
609.204	1	Mar. 30	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord.	18/—20/-	...	...
296.053	1	,,	1/3·30	1/3·30	Do. 8 p.c. Pref	22/—24/-	...	...
1,775,005	Stk.	Feb. 3	5	5	Commercial Ord.	95—100	...	96½—97¾
620.000	,,	June 8	3	3	Do. 3 p.c. Deb. ...	84—89	...	...
286.314	,,	Feb. 17	5	5	Do. 5 p.c. Deb. ...	120—125	...	...
807.560	,,	,,	7	7	Croydon sliding scale ...	158—163	...	162—163
644.590	,,	,,	5	5	Do. max. div.	115—120	...	118
620 385	,,	June 22	5	5	Do. 5 p.c. Deb.... ...	121—126*	...	...
239,000	,,	Feb. 3	5	5	East Hull Ord. 5 p.c.... ...	107—110	...	...
184.555	,,	Feb. 17	6	6	East Surrey Ord. 5 p.c. ...	130—135	...	...
176.211	,,	June 8	5	5	Do. 5 p.c. Deb. ...	120—125	...	122
19,284,128	,,	Feb. 3	5⅔	5⅔	Gas Light & Coke 4 p.c. Ord.	27/9—28/9d	...	27/9—28/3
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	90—93	...	90½
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	105—109	+½	107½—108½
8,602,497	,,	May 18	3	3	Do. 3 p.c. Con. Deb. ...	87—90	...	88—89
3,642.770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	115—118	...	116½—117½
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	114—117	...	115½
270.466	,,	Feb. 17	6	6	Harrogate New Cons. ...	130—135	...	...
157.500	1	Mar. 16	1/7½	1/7½	Hongkong & China, Ltd. ...	1⅞—1⅞	...	24/—24/7½
213.200	Stk.	Mar. 2	6	6	Hornsey Con. 3½ p.c. ...	135—140	...	...
5,600.000	,,	May 18	8	12	Imperial Continental Cap. ...	153—158	−2	155—159
223.130	,,	Jan. 20	3½	3½	Do. 3½ p.c. Red. Debs.	92—97	...	...
285.242	,,	Feb. 17	8½	8½	Lea Bridge 5 p.c. Ord. ...	175—180	...	...
165.736	,,	Mar. 16	8	10	Maidstone 5 p.c. Cap. ...	180—190	...	...
63.480	,,	June 22	3	3	Do. 3 p.c. Deb. ...	80—85*	...	...
75,000	,,	May 18	†10	†10	Malta & Mediterranean ...	195—205	...	...
392,000	—	Apl. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	102—107	...	...
231,978	Stk.	Feb. 17	5	5	M.S. Utility 'C' Cons. ...	110—115	...	112
818,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	102—107	...	...
360,075	,,	June 22	4	4	Do. 4 p.c. Deb. ...	103—108*	...	...
148.955	,,	,,	5	†5	Do. 5 p.c. Deb. ...	122—127*	...	...
125,000	—	July 1	3½	3½	Do. 3½ p.c. Rd. Rg. Bds.	97—100*	−2	...
675.000	Stk.	June 22	†3	†6	Montevideo, Ltd.	68—73*	...	71—73
225.000	,,	Feb. 17	7½	7½	North Middlesex 6 p.c. Con.	169—174	...	...
396.160	,,	Feb. 3	5	5	Northampton 5 p.c. max. ...	110—115	...	...
300,000	,,	Apl. 20	†9	†7	Oriental, Ltd....	165—170	...	...
416.617	,,	June 8	8	8	Plymouth & Stonehouse 5 p.c.	163—168	...	...
504,416	,,	Feb. 3	8½	8½	Portsmouth & Gosport Cons.	170—175	...	...
241.446	,,	,,	5	5	Do. 5 p.c. max. ...	110—115	...	...
73,350	,,	Feb. 17	...	5	Do. 5 p.c. Pref. ...	130—135	...	...
114,000	,,	Feb. 3	5	5	Preston 5 p.c. Pref.	110—115	...	...
355.698	1	Apl. 20	1/-	1/-	Severn Va'. Gas Cor. Ld. Ord.	20 6—22/6	...	22/4½
454.510	1	Mar. 16	-/10½	-/10½	,, ,, 4½ p.c. Cum. Pref.	21/—23/-	...	21/9—22/3
133.201	Stk.	Feb. 17	8½	5	Shrewsbury 5 p.c. Ord. ...	147—152	...	...
90,000	10	June 8	†3½	†4	South African...	3⅜—4⅛	...	...
1,106,173	1	May 4	1/2½	1/2½	South East'n Gas Cn. Ld. Ord.	26/—28 -	...	...
845,511	1	Mar. 16	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref.	21/—23 -	...	...
200,000	1	,,	4	4	Do. 4 p.c. Cum. Pref. ...	20/9—21/9	...	21/6
450,000	Stk.	Feb. 17	4	4	Do. 4 p.c. Red. Deb. ...	101—104	...	...
6,709,895	,,	Feb. 3	5	6½	South Met. Ord.	123—126	...	123—124½
1,135.812	,,	,,	6	6	Do. 6 p.c. Irred. Pf....	145—150	...	...
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf....	104—107	...	105—106⅝
1,895.445	,,	June 22	3	3	Do. 3 p.c. Deb. ...	87—90*	...	87½—88⅜
1,000,000	,,	Jan. 6	5	5	Do. 5 p.c. Red. Deb.	114—117	...	116—117
1,543,795	,,	Feb. 3	6	6	South Suburban Ord. 5 p.c....	131—136	...	132½—135
512.825	,,	,,	5	5	Do. 5 p.c. Pref....	122—127	...	...
500,000	,,	,,	4	4	Do. 4 p.c. Pref....	103—108	...	105—105⅜
888.587	,,	June 8	5	5	Do. 5 p.c. Deb....	121—126	...	126
250,000	,,	,,	4	4	Do. 4 p.c. Deb....	102—107	...	...
427,859	1	May 4	9⅜	1/2⅜	S. Western Gas & Water Ord.	21/6—23/6	...	22/9
160,523	1	Apl. 20	...	-/10½	Do. 4½% Red. Cum. Pref.	21'—23/-	...	22/6
110,000	Stk.	June 22	4	4	Do. 4% Red. Deb. ...	100—105*	...	...
647.740	,,	Feb. 3	5	5	Southampt'n Ord. 5 p.c. max.	115—120	+2	117½—118¼
121.275	,,	June 8	4	4	Do. 4 p.c. Deb.	100—105	...	...
350,000	,,	Feb. 3	5½	5½	Swansea 5½ p.c. Red. Pref. ...	111—116	...	...
106,000	,,	June 8	6½	6½	Do. 6½ p.c. Red. Deb. ...	98—101	...	...
94,000	,,	,,	...	...	Do. 3½ p.c. Red. Deb. ...	95—100	...	...
1,076.490	,,	Feb. 17	6⅔	6⅔	Tottenham and District Ord.	150—155	...	154½
409,835	,,	,,	5⅓	5⅓	Do. 5½ p.c. Pref. ...	130—135	...	...
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	122—127	...	...
371,850	,,	June 8	4	4	Do. 4 p.c. Deb. ...	102—107	...	106½
369.774	,,	Feb. 3	7	7	Uxbridge, &c., 5 p.c. ...	153—158	...	156
108,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	122—127	...	...
1,340,521	,,	Feb. 3	7	7	Wandsworth Consolidated ...	159—164	...	163
1,371,373	,,	,,	5	5	Do. 5 p.c. Pref. ...	122—127	...	124—125
500,000	,,	...	...	...	Do. 4 p.c. Pref. ...	104½—106½	...	105¼—105⅝
1,317,964	,,	June 8	5	5	Do. 5 p.c. Deb. ...	123—128	...	...
338,300	,,	,,	4	4	Do. 4 p.c. Deb. ...	103—108	...	...
499.735	,,	Feb. 17	6¾	7¼	Watford and St. Albans Ord.	155—160	...	157—159
200,000	,,	,,	5	5	Do. 5 p.c. Pref. ...	120—125	...	123½—124½
200,000	,,	,,	5⅓	5⅓	Do. 5½ p.c. Pref. ...	133—138	...	...
200,000	,,	June 22	4	4	Do. 4 p.c. Red. Deb.	100—105*	...	...
100,000	,,	,,	...	3½	Do. 3½ p.c. Red. Deb.	99—102*	...	...
158.400	,,	Mar. 2	5	6b	Winchester W. & G. 5 p.c. Con.	122—127	...	...

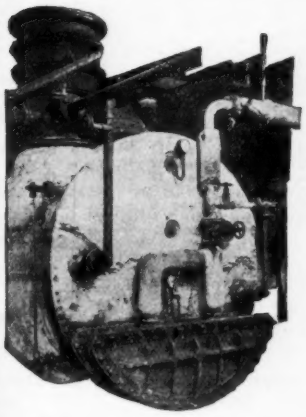
a.—The quotation is per £1 of Stock. *b.*—Paid £3, including 10s. on account of back dividends. * Ex div.
† Paid free of income-tax. ‡ For year.

Stock and Share List continued overleaf.

Judge
Permac
METAL-TO-METAL JOINTING MATERIAL.
by its Results!



"Permac" joints in an important London Gas Works.



"Permac" Joints on a Benzol Rectification Still.

Here are further examples of "Permac" Joints. All over the country "Permac," the metal-to-metal jointing material, is preferred by Engineers who have similar severe conditions to deal with. Over 25 years it has stood the test.

"Permac" stands up to all temperatures and pressures, and is equally successful on every kind of joint—steam, gas, oil, bye-product.

Permac
METAL-TO-METAL JOINTING MATERIAL.

There are many low-priced imitations—old and new—on the market. They are also low in quality.

Sole manufacturers:

THOMAS & BISHOP LTD
37, Tabernacle St.
LONDON, E.C. 2

Telephone: Clerkenwell
2 lines 1056, 0584

STOCK AND SHARE LIST—Cont.

Stocks Officially Quoted on Provincial Exchanges

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations. July 3	Rise or Fall on Week.	Transactions, Lowest and Highest During the Week.
BRISTOL EXCHANGE.								
347,756	Stk.	Feb. 3	5	6	Bath Cons.	124—126	...	...
1,667,250	,,	Feb. 17	5	5	Bristol, 5 p.c. max.	121—122	...	...
120,420	,,	June 8	4	4	Do. 1st 4 p.c. Deb. ...	101½—103½	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	101½—103½	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	124—127	...	...
274,000	,,	Feb. 17	5	5	Newport (Mon.) 5 p.c. max....	111—116	...	...
13,200	12	Mar. 16	7	8½	Pontyp'l Gas & W. 10 p.c. 'A.'	14—15	...	...
13,600	10	,,	5	6	Do. 7 p.c. B.'	11½—12½	...	...
40,000	10	,,	5	6	Do. 7 p.c. 'C.'	11½—12½	...	...
140,778	Stk.	Feb. 17	5	5	Weston-super-Mare Cons. ...	113—115	...	...
64,338	,,	June 22	4	4	Do. 4 p.c. Deb.	96½—98½*	...	...
33,340	,,	,,	7½	7½	Do. 7½ p.c. Deb.	163—166*	...	...
LIVERPOOL EXCHANGE.								
157,150	Stk.	Feb. 3	5	6½	Chester 5 p.c. Ord.	109—114	...	...
92,500	,,	June 8	4	4	Do. 4 p.c. Pref.	98½—103½	...	...
32,540	,,	,,	3½	3½	Do. 3½ p.c. Deb. ...	90—95	...	...
41,890	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	98½—103½	...	...
2,167,410	,,	Feb. 17	6	6	Liverpool 5 p.c. Ord. ...	135½—136½	...	...
245,500	,,	June 22	5	5	Do. 5 p.c. Red. Pref. ...	103—108*	...	103
306,083	,,	Jan. 6	4	4	Do. 4 p.c. Deb. ...	105—107	...	...
106,280	,,	Feb. 3	10	10	Preston 'A' 10 p.c. ...	202—212	...	...
189,219	,,	,,	7	7	Do. 'B' 7 p.c.	140—150	...	...
NEWCASTLE EXCHANGE.								
122,577	Stk.	Mar. 2	8	8	Blyth 5 p.c. Ord.	154—156	...	...
732,000	,,	Feb. 3	5	5	Hartlepool G. & W. Co. & New	120—122	+3	...
2,061,315	,,	Feb. 3	5	5½	Newcastle & Gateshead Con.	26/6—27/-a	+-/3	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	107½—108½	...	...
776,706	,,	June 22	3½	3½	Do. 3½ p.c. Deb. ...	100—101*	...	...
277,285	,,	May 4	5	5	Do. 5 p.c. Deb. '43...	103—104	...	...
209,820	,,	Mar. 2	8½	8½	South Shields Con.	169—171	...	...
299,542	,,	Feb. 3	6	6	Sunderland 6 p.c. max. ...	129—131	...	...
NOTTINGHAM EXCHANGE.								
542,270	Stk.	Feb. 17	7	10	Derby Con.	176—186	...	...
55,000	,,	June 22	4	4	Do. 4 p.c. Deb.	100—105*	...	...
84,750	,,	Feb. 17	5	12	Long Eaton 'A' Ord. ...	175—185	...	...
50,000	,,	,,	4	10	Do. 'B' Ord. ...	130—140	...	...
20,000	10	June 8	5	5	Do. 5 p.c. Pref. ...	10—12	...	...
80,000	Stk.	,,	5	5	Do. 5 p.c. Deb. ...	117—122	...	...
SHEFFIELD EXCHANGE.								
10,000	Stk.	Feb. 17	10	10	Great Grimsby 'A' Ord. ...	220—230	...	...
6,500	,,	,,	10	10	Do. 'B' Ord. ...	220—230	...	...
79,008	,,	,,	10	10	Do. 'C' Ord. ...	205—215	...	...
1,806,339	,,	Feb. 17	6	6	Sheffield Cons.	146—148	...	...
95,000	,,	Dec. 16	4	4	Do. 4 p.c. Deb.... ...	100½—102½	...	...

a The quotation is per £1 of Stock.

Supplementary List of Stocks and Shares not Officially Quoted

202,152	Stk.	...	...	...	Ascot Ord.	119—124	...	...
128,182	,,	...	...	...	Do. 5 p.c. Pref.	117—122	...	...
238,631	1	June 8	5	5	Assd. Gas and Water Ord....	21/—23/-	...	...
323,681	1	,,	4½	4½	Do. 4½ p.c. Cum. Pref. ...	21/—23/-	...	...
150,000	Stk.	...	...	...	Do. 3½ p.c. Red. Deb. ...	...	...	...
17,000	,,	Feb. 17	8	8	Bognor Orig. Ord. 'A' ...	175—185	...	...
62,210	,,	,,	8	8	Do. New Addl. 'A' ...	175—185	...	...
87,160	,,	,,	7	7	Do. New 7 p.c. max. ...	145—150	...	...
37,440	,,	Feb. 3	10	10	Cam.Univ. & Town 10 p.c.max.	210—220	...	...
125,970	,,	,,	7	7	Do. 7 p.c. max.	158—163	...	159½
39,025	,,	,,	5	5	Do. 5 p.c. max.	108—113	...	...
65,000	,,	Mar. 2	7½	8½	Eastbourne 'A' 5 p.c. ...	170—175	...	...
198,000	,,	,,	6	7	Do. 'B' 3½ p.c.	140—145	...	...
112,312	,,	,,	5	5	Do. 5 p.c. Pref.	120—125	...	...
130,000	,,	June 22	5	5	Do. 5 p.c. Deb.	120—125*	...	...
250,000	1	June 22	4	6	Gas Consolidation Ord. ...	20/—22/-*	...	21/3
250,000	1	May 18	4	4	Do. 4 p.c. Red. Cum. Pref.	19/—20/	...	19/6—19/7½
700,000	Stk.	...	...	...	Gas Light & Coke 3½ p.c. Rd. Db	102½—104½	...	104½
24,000	30	Feb. 3	8½	8½	Great Yarmouth 8½ p.c. max.	52—57	...	...
59,400	30	,,	7½	7½	Do. 7½ p.c. max.... ...	42—45	...	...
51,160	Stk.	June 8	5½	5½	Do. 5½ p.c. Deb.... ...	123—128	...	...
152,600	,,	Mar. 2	8	8	Guildford Cons.	185—195	...	...
54,055	,,	,,	5	5	Do. 5 p.c. Pref.	114—119	...	...
68,250	,,	June 8	5	5	Do. 5 p.c. Deb.	120—125	...	...
156,600	,,	Feb. 3	7½	7½	Hampton Court Cons. ...	173—178	...	176
81,660	10	Feb 4,'35	5	9	Leatherhead Ord.	16—17	...	...
107,960	10	Mar. 16	4	5½	Mid Kent Ord.	10—11	...	...
230,940	Stk.	Feb. 17	10	10	Oxford & District Ord. ...	210—220	...	...
47,112	,,	,,	5	5	Do. 5 p.c. Pref.	118—123	...	...
50,000	,,	,,	6	6	Do. 6 p.c. Red. Pref. ...	113—118	...	...
126,193	,,	May 18	7½	7½	Peterborough Ord.	157—167	...	...
64,990	,,	Mar. 16	6½	7½	Redditch Ord.	135—140	...	...
166,850	,,	Feb. 17	7	9	Romford Ord.	170—180	...	...
60,000	,,	,,	4	4	Do. 4 p.c. Pref.	97—100	...	...
44,000	,,	Mar. 16	5	5	Do. 5 p.c. Deb.	120—125	...	...
10,950	,,	Mar. 2	8	8	Ryde Ord.	165—170	...	...
136,191	,,	Feb. 3	5	7	Scarborough Ord.	128—138	...	...
27,825	,,	Feb. 3	8	8	Shanklin & Ventnor Cons. ...	152—162	...	...
40,643	,,	Mar. 2	7	7	Slough Ord.	147—152	...	...
221,000	,,	June 22	5	5	Do. 5 p.c. Deb.	116—121*	...	...
28,872	1	May 4	5½	5½	S. Midland Gas Cpn.Ltd. Ord.	20/—22/-	...	20/9
28,866	1	Mar. 16	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/6—21/6	...	...
137,730	Stk.	Feb. 17	7	7	Southgate & Dist. 7 p.c. max.	153—158	...	...
62,500	,,	,,	5	5	Do. 5 p.c. Pref.	115—120	...	...
117,228	,,	Mar. 2	5	6	Swindon Cons.	111—116	...	...
60,425	,,	June 22	5	5	Do. 5 p.c. Deb.	120—125*	...	...
50,000	1	Mar. 30	...	5·52d. a	Utd. Kingdom Gas Cpn. Ord.	20/6—22/6	...	21/3—22/-
760,910	1	,,	2½	2½	Do. 4½ p.c. Prefd. Ord....	20/—22/-	...	20/1½—21/-
110,910	1	May 18	2½	4½	Do. 4½ p.c. Cum. Pref. ...	21/—23/-	...	21/6—21/10½
900,000	Stk.	Mar. 16	...	3½	Do. 3½ p.c. Red. Deb. ...	98—101	...	...
130,000	,,	Feb. 3	5	8	Wakefield Ord.	140—145	...	143
81,650	,,	,,	5	5	Do. 5 p.c. max.	105—110	...	...
82,000	,,	Feb. 3	6	6	Weymouth Ord.	106—111	...	...
98,384	,,	Feb. 3	6	6	Wolverhampton 6 p.c. Pref.	127—132	...	...
160,000	,,	June 8	5½	5½	Do. 5½ p.c. Rd. Db	107—112	...	...
370,000	,,	Feb. 3	4	6	York Cons.	107—112	...	110½
90,000	,,	June 22	5	5	Do. 5 p.c. Red. Deb. ...	103—108*	...	...
133,640	,,	Feb. 3	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	130—135	...	...
120,000	,,	,,	5	5	Do. 5 p.c. Pref.	115—120	...	...
35,000	,,	June 22	5½	5½	Do. 5½ p.c. Deb.... ...	130—135*	...	...

a Actual.

Service

The value of your Sales and Service men is gauged by the knowledge they possess of matters pertaining to the Industry they serve. The more knowledge they possess the greater the assistance they can be towards building up an efficient and successful organization.

At little cost, the "GAS SALESMAN" (published monthly) offers a ready means to this end. As the only separate publication devoted exclusively to the sales and service side of the Industry, it has an individuality of its own and keeps its readers abreast of the times.

Do all your sales and service men regularly receive a copy of each month's issue?

Specimen copies will gladly be supplied on request.

The annual subscription is 6s.

All communications to Walter King, Limited, The "GAS SALESMAN" Offices, 11, Bolt Court, Fleet Street, London, E.C. 4.